

Remedial Investigation / Feasibility Study Health and Safety Plan

Macon Naval Ordnance Plant Superfund
Site (GAD003302676) Macon, Georgia

18 March 2019

Project No.: 0482419


March 18, 2019

Health and Safety Plan

Macon Naval Ordnance Plant Superfund Site (GAD003302676)
Macon, Georgia


ERM Southeast Inc.
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	Applicability:	Form	Document Number:	Version:
	North America		NAM-1114-FM1	7
	Title:	Level 3 Health and Safety Plan	Last Revision Date:	7/16/18

This Level 3 health and safety plan (HASP) provides health and safety guidelines for **complex sites with unique and/or significant health and safety planning or client requirements**. The information in the template meets various regulatory requirements. Many sections are specifically required by 29 CFR 1910.120 and 29 CFR 1926.65, the US Occupational Safety and Health Administration's (OSHA) Hazardous Waste Operations and Emergency Response (Hazwoper) standards.

The HASP was developed with input from the project team and reviewed with all ERM project personnel, including contractors prior to the start of work. A signed copy of the HASP must be maintained at the project site during work and must be archived in the project files.

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Administrative Information

This document is valid for a maximum time period of one year after completion. The document must be reviewed if the scope of work or nature of site hazards changes and must be updated as warranted.

Project Name: Macon Naval Ordnance Plant Superfund Site	Site Name & Location: 600 Guy Paine Rd Macon, GA 31206
Client Contact and Phone: Tyler Garrison	Client: Macon-Bibb County Industrial Authority
Health & Safety Plan Date: 3/18/2019	GMS Project #: 0482419
Partner in Charge: William A. Butler	Revision Number and Date: 00
Project Manager: Martin Crook	Field Work Start Date: <i>within 60 days of EPA approval</i>
Field Safety Officer: Taylor Payne, William Virgo, Hannah Beaugh	Anticipated Field Work End Date: <i>180 days after start of field work</i>
SSC Experienced Person (if applicable): Taylor Payne, William Virgo	Short Service Employees (SSE): N/A
Additional ERM personnel on site: Brandon Ramirez, Bradley Griffith, Alex Brown, Caroline Pasternak, Ed Hollifield	SSE Mentor: N/A

Subject Matter Expert Review

SME review and approval is required if the project includes contractors that will be performing work over or in water, using mobile construction equipment (excluding drilling equipment), or will be working without direct ERM supervision.

SME Review Required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If Yes, SME Name(s): SME Review Date:
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Site Description


Include relevant background information regarding the site, such as location, size, type of facility, topography, weather, infrastructure, security, previous site use, etc. Describe nature and extent of any soil/air/water/groundwater contamination. Describe any other aspects of the site that may potentially affect the health, safety, or security of on-site personnel.

This Health and Safety plan accompanies the Remedial Investigation (RI) and Feasibility Study (FS) Work Plan for the Macon Naval Ordnance Plant Site (the "Site"), prepared by ERM on behalf of the performing respondents identified in the *Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study* (Settlement Agreement) dated September 2018.

The Site is located at 600 Guy Paine Road in Macon, Bibb County, Georgia. The Site location is shown in [Figure 1](#). The Site is bounded to the north by Guy Paine Road, to the east by Mead Road and the abandoned Central of Georgia railroad tracks, to the southeast by the City of Macon Water Authority (MWA) Rocky Creek Water Reclamation Facility, to the south by the Armstrong World Industries Superfund Site (AWI Site) OU2 and Rocky Creek, and to the west by the AWI Site OU1. A general layout of the Site and surrounding properties is shown on [Figure 2](#).

Current land use in the area is primarily industrial, with some commercial. Many of the buildings and infrastructure at the Site were originally part of the Macon Naval Ordnance Plant (MNOP). The total current area of the Site is approximately 254 acres, but the facility historically included additional areas (such as portions of AWI Site OU2), with a maximum extent of approximately 433 acres.

The Site resides on an upland surface and southern tip of a tongue-shaped peninsula, which it shares with the southernmost portion of the city of Macon, Georgia. The peninsula is surrounded on three sides (west, south, and east) by the floodplains of Rocky Creek and the Ocmulgee River. A series of progressively raised alluvial terraces extend from the floodplain of Rocky Creek to an abandoned railroad spur that runs west to east across the southern third of the Site. The land surface elevation ranges from approximately 375 feet above mean sea level (ft amsl) in the north-central portion of the site to 275 ft msl along Rocky Creek. The Ocmulgee River is located approximately 2.3 miles east of the Site and is accompanied by a well-developed

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floodplain that averages 2 miles in width (SAIC, 2000). The primary land cover feature surrounding both Rocky Creek and the Ocmulgee River is Freshwater Forested/Shrub Wetlands (ERIS, December 2018).

The Site is located within the Ocmulgee River watershed. Rocky Creek originates northwest of Macon, traversing through the western margins of the city, turning eastwards south of Macon and joining with Tobesofkee Creek and eventually merging with the Ocmulgee River just over four miles downstream of the Site. The site is located in flood zone X-12, minimal flood risk (<0.2 percent annual flood risk). (FEMA, 2017)

Drainage flows onto the Site from surface drainage features to the northeast and northwest of the site. Surface water runoff at the Site generally follows the land topography, which slopes gently southward across the Site. A small tributary enters the property at the northeast corner and runs parallel to Mead Road before it exits the Site south of Allied Industrial Boulevard. A topographic low occurs in the northwest section of the Site, where surface drainage appears to run off during storm events into a small creek along the western property boundary. This creek eventually crosses the road connecting the Site to AWI Site OU2 and becomes a drainage easement. The drainage flows under the former railroad spur in the southwest portion of the property and empties into Rocky Creek in a wooded area south of the Site. Site drainage features are shown on [Figure 2](#).

The Site weather is characterized as humid subtropical with moderate seasonality, common to the gulf and east coast states. Summers are hot and humid and winters are mild and average higher precipitation. The annual average temperature is 64 degrees Fahrenheit (F), with monthly average temperatures ranging from 58 – 93 degrees F. Annual precipitation averages 45.7 inches, with monthly average precipitation ranging from 2.7 inches to just under 5 inches per month. On average, 205 days are between the last and first frost, with the growing season extending from late February to early November.


The Site is primarily characterized by structures, pavement, and maintained landscape areas developed for industrial purposes. Pockets of natural habitat exist at the Site, with the largest area measuring approximately 23 acres.

Potential sources of constituent release during historical operations at the Site were identified and investigated in prior studies, including the following:

- former WWTP;
- storm water drain outfalls;
- metal plating facility (Building 5);
- electrical transformer houses;
- former solvent storage sheds (Buildings 99, 175, 190-193);
- explosives assembly and loading area (Buildings 106, 106A and 109);
- oil recovery area; and
- ASTs and USTs.


Chemical characterization of soil in and around these areas did not reveal the presence of constituents in soil at concentrations above their EPA Regional Screening Levels (RSLs) for industrial soil. TCE was detected at the highest concentrations in soil samples collected near the former WWTP outfall area (1.7 mg/kg at ISL-117 0-2') and metals plating facility (1.2 mg/kg at ISL-004 1-3');

The primary groundwater constituents of concern at the Site include TCE, cDCE, and VC. The presence of cDCE and VC may be attributable to naturally occurring biodegradation of TCE. Based upon concentration and broad distribution, TCE is considered the primary indicator constituent and risk driver for development of the RI. Based on groundwater data collected in 2009 and as shown on [Figure 3](#), three TCE plumes appear to exist in the shallow unconfined water table zone with apparent disparate sources at the Site. The main TCE plume is present at a former stormwater discharge outfall located adjacent to the former WWTP at the western property boundary, and the former WWTP and outfall are suspected sources of TCE. A middle TCE plume appears to originate from the former plating operation in Building 5 and possibly from a source in Building 6. A third, lower concentration TCE plume originates near former Building 108. These two lower concentration TCE plumes are potentially associated with former solvent storage sheds identified in the vicinity of the apparent origins of these plumes. The storage sheds will be assessed as part of the Phase I RI. These three plumes coalesce into one main plume as they migrate from their sources south toward Rocky Creek. South of the Site, the plume appears to be located laterally between the FMNOL and the Rocky Creek Waste Water Treatment Plant. The shape and distribution of the TCE plume appears to being partly controlled by peolochannels or relict

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alluvial deposits located in the shallow sediments. Based on previous assessment, there is no evidence supporting the downward vertical migration of COPCs from the unconfined water table zone to the underlying Tuscaloosa Aquifer.

In addition, TCE is present in sub-slab soil gas and indoor air in some locations. The potential for constituent migration into indoor air is largely controlled by the presence and concentrations of TCE and other VOCs in shallow groundwater, but also by overlying building construction. Additionally, the extent of migration of constituents in soil vapor may be affected by utility trenches and corridors or other subsurface structures that can serve as preferential pathways for vapor-phase constituents of potential concern.

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Field Activities

Include list of tasks to be completed by ERM personnel during this project, and a separate list of tasks to be completed by any contractors at the site. A site-specific Job Hazard Analysis (JHA; [ERM-1115-FM1](#)) must be completed for each task to be performed.

To satisfy the objectives of the Remedial Investigation / Feasibility Study, ERM will perform site reconnaissance; soil gas surveys at the three areas indicated in [Figure 4](#); re-develop and collection groundwater samples from monitoring wells shown in [Figure 4](#); install vapor pins and collect sub-slab soil gas, indoor air and ambient air samples at the locations shown in [Figure 4](#); as well as collect soil and groundwater samples collected by a direct-push drilling rig.

Job Hazard Analyses (risk analysis) for each of the activities listed below are included as [Appendix A](#).


ERM Task 1: Site Reconnaissance	<input checked="" type="checkbox"/> JHA Attached?
ERM Task 2: Soil Gas Survey	<input checked="" type="checkbox"/> JHA Attached?
ERM Task 3: Direct Push Soil and Groundwater Sampling	<input checked="" type="checkbox"/> JHA Attached?
ERM Task 4: Vapor Pin Installation for Sub-slab Soil Gas Sampling	<input checked="" type="checkbox"/> JHA Attached?
ERM Task 5: Groundwater Sampling	<input checked="" type="checkbox"/> JHA Attached?
ERM Task 6: Soil Sampling	<input checked="" type="checkbox"/> JHA Attached?
ERM Task 7: Groundwater Well Gauging	<input checked="" type="checkbox"/> JHA Attached?

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Key Project Personnel and Responsibilities

The section includes the roles, names, contact information, and responsibilities of ERM personnel, ERM contractors, and other individuals associated with health and safety leadership on this project. This page should be posted on-site.


Role	Person	Contact Information	Responsibilities
Partner-In-Charge (PIC)	William A. Butler	Phone: 678-486-2700	Final authority in approving the HASP and ensuring that the project team is supplied with the training, equipment and materials necessary for a safe work environment.
		E-mail: bill.butler@erm.com	
Project Manager (PM) or Construction Manager (CM)	Martin Crook	Phone: 678-486-2767	Implementing the requirements of the ERM Health & Safety Program on this project and maintaining management awareness of the project's health and safety status. Provide H&S leadership during project performance.
		E-mail: martin.crook@erm.com	
Field Safety Officer (FSO)	Hannah Beough Taylor Paine Will Virgo	Phone: 678-486-2700	Assist the PM/CM by implementing HASP on a day-to-day basis. Recognize significant H&S hazards and utilize STOP WORK authority when appropriate.
Business Unit Health and Safety (H&S) Director	Millard Griffin	Phone: 678-486-2728	Assist in the recognition, evaluation, and control of hazards associated with the site.
		E-mail: millard.griffin@erm.com	
Assigned ERM Employees	Listed on Signature Page	Not applicable	ERM employees will fully participate in the implementation of the HASP by obtaining necessary training, attending site safety meetings, wearing designated PPE, complying with site H&S rules, and advising the FSO of H&S concerns at the site.
Client Contact	Tyler Garrison	Phone: 478-223-0576	coordinate with ERM and communicate schedule conflicts or other work occurring at the site which may affect work proposed by ERM or their subcontractors
		E-mail: tgarrison@mbcia.com	

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Site/Project General Information	
Site Type (check all applicable boxes)	
<input checked="" type="checkbox"/> Industrial/commercial <input type="checkbox"/> Residential <input type="checkbox"/> Unsecured <input type="checkbox"/> Coastal/offshore (on or near water)*	<input type="checkbox"/> Hazardous waste release (Hazwoper) <input checked="" type="checkbox"/> Remote site or inactive facility** <input type="checkbox"/> Other (specify): Click here to enter text. <input type="checkbox"/> Other (specify): Click here to enter text.
* ERM Form NAM-1534-FM1 (Coastal and Offshore Risk Management) must be completed and attached to this document. ** ERM Form NAM-1501-FM2 (Undeveloped, Remote, or Inactive Sites) must be completed and attached to this document.	
Main Project Hazards (check all applicable boxes)	
<input type="checkbox"/> Aerial Lift Use (e.g., Scissor Lifts, Cherry Pickers) ¹ <input type="checkbox"/> All-Terrain Vehicle/Snowmobile Use ¹ <input type="checkbox"/> ASTs/USTs <input checked="" type="checkbox"/> Biological Hazards <input type="checkbox"/> Chemical Exposure Potential (including asbestos) <input type="checkbox"/> Chemical Mixing/Injection <input type="checkbox"/> Compressed Gas <input type="checkbox"/> Confined Space Entry ² <input type="checkbox"/> Construction ¹ <input type="checkbox"/> Control of Hazardous Energy (i.e., Lockout/Tagout) ² <input type="checkbox"/> DDD Operations ¹ <input type="checkbox"/> Diving ¹ <input checked="" type="checkbox"/> Ergonomics/Material Handling <input checked="" type="checkbox"/> Excavation/Trenching/Drilling ² <input type="checkbox"/> Extended or Nonstandard Work Shifts (>14 hours) <input type="checkbox"/> Extreme Weather <input type="checkbox"/> Explosives Use ¹ <input type="checkbox"/> Falls from height (>4 feet) ¹ <input type="checkbox"/> Forklift/Industrial Truck Use ¹ <input checked="" type="checkbox"/> Hand/Power Tool Use <input type="checkbox"/> Heavy Equipment Use	<input type="checkbox"/> Helicopter/Fixed Wing Aircraft Transportation ³ <input checked="" type="checkbox"/> High Noise (>85 dBA) <input type="checkbox"/> Hot Work (Welding, Cutting, Brazing) ² <input type="checkbox"/> International Travel ⁴ <input type="checkbox"/> Long Distance/Duration Driving ⁵ <input type="checkbox"/> Mining (Surface/Underground) <input checked="" type="checkbox"/> Natural Hazards (Plants, Animals, Insects) <input type="checkbox"/> Off-Shore Platform Work ⁶ <input checked="" type="checkbox"/> Overhead Power Lines <input type="checkbox"/> Portable/Fixed Ladders <input type="checkbox"/> Radiation (Ionizing/Non-ionizing) <input type="checkbox"/> Rigging/Lifting ² <input type="checkbox"/> Scaffold Use <input type="checkbox"/> Shift Work (e.g., night work) <input type="checkbox"/> Short Service Employees <input checked="" type="checkbox"/> Slips/Trips <input checked="" type="checkbox"/> Subsurface Clearance (Buried Utilities) ² <input type="checkbox"/> Working on/over/near Water (including transport) ¹ <input type="checkbox"/> Unexploded Ordnance/Munitions and Explosives of Concern (UXO/MEC) ¹ <input type="checkbox"/> Other (specify): Click here to enter text.

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- 1 High hazard work requiring H&S team coordination. Additional control measures may be required beyond JHA.
- 2 Permit-required high hazard work requiring H&S Team coordination and ERM or equivalent client-required permit to be completed.
- 3 If traveling using a helicopter or fixed wing aircraft, ERM employees are required to follow the provisions of ERM Standard [ERM-1440-ST1](#) (*Fixed Wing Aircraft and Helicopter Safety*).
- 4 A Travel Risk Assessment (TRA) is required for all international travel (with the sole exception of travel to a Low Risk country where ERM has a permanent office). Consult ERM Standard [ERM-1410-ST1](#).
- 5 If driving more than 500 km (310 miles) in a single day, driving in excess of 4.5 hours in a single day, or driving in a remote location, a Journey Management Plan ([ERM-1430-FM1](#)) is required and should be appended to this HASP.
- 6 If traveling to/from and working on an off shore platform, ERM employees are required to follow the provisions of ERM Standard [ERM-1531-ST1](#) (*Offshore Platform Safety*).

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Employee Training, Medical Surveillance, and Safety Equipment Requirements

Req = Required; requirements are based on the specific tasks performed in the field and the type of environments, chemicals, or hazards encountered. NA = Not applicable to this project.

All ERM and ERM contractor personnel working on-site (including their on-site supervisors) who may be exposed to hazardous substances, health hazards, or safety hazards will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility and medically qualified to perform the work. The PM/CM will verify that site personnel have received all appropriate training as required by this HASP prior to their arriving on-site by reviewing written training documentation. Copies of the written training documentation will be retained in the project safety file.


For the duration of the project, at least one individual currently certified to render emergency first aid and/or CPR will be present during all work activities. Additional medical surveillance will be provided for employees who are injured, become ill or develop signs or symptoms due to possible exposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

Training	Req	NA	Medical Surveillance***	Req	NA
40-Hour Hazwoper	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Medical Clearance	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Current 8-hour Hazwoper Refresher	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Respirator Clearance and Fit Test	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8-Hour Hazwoper Supervisor*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Blood Lead and ZPP	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Current First Aid/CPR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Other (specify): Click here to enter text.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
40-Hour MSHA New Miner	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other (specify): Click here to enter text.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Current 8-hour MSHA Refresher	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safety Equipment	Req	NA
ERM Field Safety Officer (FSO)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	First Aid Kit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
DDD Practice FSO/DM	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Eyewash Solution	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Subsurface Clearance (SSC)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Air Horn	<input type="checkbox"/>	<input checked="" type="checkbox"/>
EPA Hazardous Waste	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Decontamination Supplies	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hazmat/Dangerous Goods Shipping**	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fire Extinguisher	<input checked="" type="checkbox"/>	<input type="checkbox"/>
International Traveler	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Potable Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10-Hour Construction Training	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Toilets	<input checked="" type="checkbox"/>	<input type="checkbox"/>

* Provides specialized training to serve as an on-site manager supervising employees engaged in work covered by 29 CFR 1910.120.

** In Canada, Workplace Hazardous Materials Information System (WHMIS)/Globally Harmonized System (GHS) and Transportation of Dangerous Goods (TDG) regulations apply.

*** Physical examination requirements should be discussed with WorkCare well in advance of project to allow adequate time to schedule exams.

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Hazard Identification and Control

Site Inspections: The FSO or designee will perform daily walkthrough inspections of the job site to assess conditions. On a regular basis, the FSO or designee will complete a full safety inspection of the site using ERM's Global Field Audit Checklist ([ERM-1941-FM4](#)). Completed checklists will be retained in the site safety file.

Designated frequency of site inspections: *Once per month for field events > 1 week duration.*

Behavior-Based Safety. Everyone on site as part of this project will make a commitment to work safely and to look out for others on the job site. Describe any tools used to help ERM personnel and ERM Contractors think about the safety-related aspects of the work at hand, as described in the applicable JHAs:

Everyone on site as part of this project will make a commitment to work safely and to look out for others on the job site. Tools, such as daily tailgate meetings prior to beginning work, and review of the HASP, lessons learned on similar projects and JHAs will be used to help ERM personnel and ERM Contractors to think about the safety related aspects of the work at hand, as described in applicable JHAs.


Stop Work Authority. It is ERM policy that all site personnel have the authority, without fear of reprimand or retaliation to:

- **Immediately** stop any work activity that presents a danger to the site team or the public; and
- Get involved, question and rectify any situation or work activity that is identified as not being in compliance with the HASP or with broader ERM health and safety policies.

All site personnel are empowered to identify and correct unsafe acts, unsafe conditions and near misses before they can cause an incident. After all, **you see it, you own it!**

If someone utilizes their Stop Work Authority, then work can only be restarted by the FSO, in concert with the CM/PM and PIC.

Work Permit System: If the Client mandates use of a Work Permit system, please describe the system and the checklists or permits that may be required.

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Chemical Hazards

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

Chemical Products Used or Stored On-Site

For each chemical product identified, a Safety Data Sheet (SDS) must be attached to this HASP. Note that Emergency eyewash solution must be readily available on all project sites where materials are used or stored that pose a risk of getting into the eyes via splashing or through contact with airborne gases, vapors, dusts, or mists. This includes sample preservatives. The size and flushing capability of the eyewash must be proportional to the potential for contact with corrosive or injurious materials in the field and the resulting potential for injury. Contact your BU H&S Director for additional information or assistance.

<input checked="" type="checkbox"/> Alconox or Liquinox <input checked="" type="checkbox"/> Hydrochloric acid (HCl) <input checked="" type="checkbox"/> Nitric acid (HNO ₃) <input checked="" type="checkbox"/> Sulfuric acid (H ₂ SO ₄) <input type="checkbox"/> Sodium hydroxide (NaOH) <input type="checkbox"/> Isopropyl alcohol	<input type="checkbox"/> Household bleach (NaOCl) <input checked="" type="checkbox"/> Calibration gas <input type="checkbox"/> Other (specify): Click here to enter text. <input type="checkbox"/> Other (specify): Click here to enter text. <input type="checkbox"/> Other (specify): Click here to enter text. <input type="checkbox"/> Other (specify): Click here to enter text.
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Regulated Chemicals of Concern

Check any chemicals known or suspected to be present on the site to which the ERM team may be exposed to determine if they are regulated through any federal or provincial laws. These regulations may include OSHA-regulated potential carcinogens (29 CFR 1910.1003 through 1016), those chemicals for which OSHA has established specific respiratory protection requirements (29 CFR 1910.134), or any chemical identified under Canadian provincial regulations. A list of applicable regulations addressing regulated chemicals is provided in Section 5 of ERM Procedure [NAM-1340-PR1](#) (*Chemical Hazards*). A list of OSHA regulated chemicals is provided in Appendix 1 of that procedure.


Are any of the chemicals that appear on the list in Section 3 of [NAM-1340-PR1](#) known or suspected to be present on the site?
☒ Yes ☐ No

If the answer to the question above is Yes, follow the requirements of [NAM-1340-PR1](#). For additional assistance with interpretation /evaluation of the regulatory impacts, contact your Business Unit H&S Director.

Additional Known or Suspected Chemicals of Concern

Are there additional known or suspected chemicals of concern present on the site not identified in the **Regulated Chemicals of Concern** section above? ☒ Yes ☐ No

[NAM-1340-FM1](#) (*Known or Suspected Chemicals of Concern*) is attached to this HASP. Information on each chemical must be provided to all team members.

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Ambient Air Monitoring

Ambient air monitoring should be conducted by the FSO when there is a question of employee exposure to hazardous concentrations of substances to assure the proper selection of engineering controls, work practices, and PPE. Additional monitoring should be conducted under any of the following circumstances.

- Work begins on a different portion of the site;
- Change in job tasks;
- Change in weather;
- Change in ambient levels of hazardous constituents as indicated by the sense of smell or changes in the physical appearance of the soil or ground water;
- When new hazardous substances are encountered; and
- During high-risk operations (e.g. drum opening, handling of leaking drums, or when working in areas with obvious liquid contamination).

Ambient air monitoring will be conducted using direct-reading real-time instruments. Not all work at the site will require ambient air monitoring for all contaminants. During the mobilization phase of a particular project task or activity, either the PM or the FSO will determine what contaminants may be encountered in order to have the appropriate instrumentation on-site. The Business Unit H&S Director is available to assist the PM or the FSO in determining the appropriate instrumentation.


Under stable site conditions, ambient air monitoring will be conducted at least once every two hours in the workers' breathing zone and at other locations based on the professional judgment of the FSO or the Subject Matter Expert. Ambient air monitoring results will be recorded on [NAM-1302-FM2](#) (*Ambient Air Monitoring Form*). If site conditions become unstable or change dramatically, ambient air monitoring will be conducted more frequently based on the professional judgment of the FSO or the Business Unit Health and Safety Director.

Monitoring Equipment

Will ERM staff be using equipment on the project site to monitor potential exposures to known or suspected chemicals of concern? ☒ Yes ☐ No

ERM Form [NAM-1302-FM3](#) (*Monitoring Equipment*) is attached to define the equipment to be used and the action levels to be applied.

All monitoring equipment on site must be calibrated per manufacturer specifications (including daily bump tests) and results recorded. See ERM Procedure [NAM-1302-PR1](#) (*Equipment Maintenance and Calibration*) for additional information. Under stable conditions, measurements must be made in the breathing zone at least once every 30 minutes.

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Personal Protective Equipment

The level of PPE selected for a task is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity;
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done; and
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.


In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified.

General items of PPE to be used during site activities can be summarized below. Specific PPE ensembles should be identified in the task-specific JHA.

Equipment	Req	NA	Supplies	Req	NA
Steel-toed Boots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Inner Chemical Gloves	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Outer Disposable Boots <u>During Direct-Push Drilling and Sampling Only</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Outer Chemical Gloves	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Long Sleeve Shirt/Pants	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Leather Gloves	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Tyvek Suit <u>During Direct-Push Drilling and Sampling Only</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Cut-resistant (i.e., Kevlar) Gloves	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Poly-Coated Tyvek Suit	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safety Glasses/Goggles	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Fully Encapsulated Chemical Suit	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Face Shield	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Flame Resistant Clothing/Coveralls	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hearing Protection <u>During Direct-Push Drilling and Sampling Only</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
High Visibility Traffic Vest	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Half-face Respirator	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hard Hat/Approved Helmet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Full-face Respirator	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wet Suit/Dry Suit	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Personal Floatation Device	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other (specify): Click here to enter text.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If either half or full-face respirator checked: <ul style="list-style-type: none"> • Define cartridge type: Click here to enter text. • Define cartridge change frequency: Click here to enter text. 		
Other (specify): Click here to enter text.	<input type="checkbox"/>	<input checked="" type="checkbox"/>			

Respirator selection should be based on the Assigned Protection Factor (APF) and the Maximum Use Concentration (MUC). To determine the appropriate respirator selection, the lowest appropriate published exposure guideline should be known. The Business Unit H&S Director or project H&S consultant can provide assistance in defining the APF and MUC, as necessary. They can also assist in defining actions levels and cartridge change schedules when air-purifying respirators are used. Note that cartridge change schedules must be outlined above and in the JHA for any task requiring respiratory protection.

Use of respiratory protection requires three elements: training in respiratory protection techniques, completion of medical surveillance confirming that you are fit to wear a respirator, and fit testing with the make and model of respirator you will be using. Refer to [NAM-1311-PR1](#) (*Respiratory Protection*) for additional information.

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Site Infrastructure

Smoking and Eating Areas: Smoking will only be allowed in designated areas. Upon mobilization at the site, the FSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination.

Upon mobilization at the site, the FSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition. Employees will wash their hands before entering eating areas.

Sanitation and Potable Water: Containers used for drinking water will be equipped with a tap and capable of being tightly closed. In addition, the container will be labeled as “Drinking Water” or “Potable Water.” Disposal cups will be stored in a sanitary condition and a receptacle for disposing of the cups will be near-by.

Potable and non-potable water containers and portable toilets (if used) will comply with OSHA 29 CFR 1910.141 requirements

Temporary Facilities: Where needed, trailers and other temporary structures used as field offices or for storage will be anchored with rods and cables or by steel straps to ground anchors. The anchor system will be designed to withstand winds and must meet applicable state or local regulations for the anchoring of mobile trailer homes.

All temporary facilities will be maintained in a clean and sanitary condition to discourage the entrance of rodents or vermin. If rodents or vermin become an issue, the FSO will be responsible for implementing an extermination program per site-specific or client-specific guidelines

Safety Equipment: Field first aid kits are maintained in the following locations: [Click here to enter text.](#)


Fire extinguishers are maintained in the following locations: [Click here to enter text.](#)

The FSO will be responsible for ensuring that all fire extinguishers are inspected monthly as required by 29 CFR 1910.157

Portable Fire Extinguishers. The monthly inspections will be documented on a tag attached to each extinguisher or a master list of fire extinguishers and their location. If the duration of the project exceeds one year, the FSO will contract with an outside vendor to perform the annual maintenance on all fire extinguishers.

Eye wash stations will be located at the following designated locations: [Click here to enter text.](#)

Communications: Telephones and plant radios will be used for communication between the project team and the client. If cell phones are allowed, cell phones may be used as part of the communication method. However, cell phones cannot be used in operating process units or while driving any type of vehicle.

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General Site Rules

The following general rules will be adhered to at all times:

- All personnel entering the site must check in with the FSO.
- All individuals entering the site must demonstrate to the FSO that they have been adequately trained as defined elsewhere in this HASP.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before, during operations, or immediately after hours is absolutely forbidden. Alcohol can reduce the ability to detoxify compounds absorbed into the body as the result of minor exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.
- Horseplay of any type is forbidden.
- All unsafe conditions will be immediately reported to the FSO, who will document such conditions in the field log. The FSO will be responsible for ensuring that the unsafe condition is corrected as quickly as possible.
- No smoking, eating, chewing gum or tobacco, taking medication, or applying cosmetics in the Contamination Reduction Zone or the Exclusion Zone. Wash hands and face thoroughly prior to conducting the activities in the Support Zone.
- Smoking, matches, and lighters are only allowed in the designated smoking area.
- Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.
- If PPE becomes torn or saturated with contaminated material, immediately leave the Exclusion Zone, go through the decontamination steps, and replace the affected PPE. Additionally, wash any exposed skin thoroughly with soap and water.

The FSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder or flash of lightning. During rain, lightning and/or thunder events, site workers should seek shelter in either a building or vehicle. In the event of a tornado, site workers should seek shelter in a building, expect trailers, or in a low-lying area.

For work in individual business facilities or battery limits, workers will be oriented to the specific safety rules for that facility and they will be reviewed with workers during the Daily Safety Meeting, and documented in the Site Safety Meeting Form [NAM-1501-FM1](#).


Work Zones

The following specific Work Zones will be established during direct-push drilling operations because of potential chemical and/or equipment hazards.

*The **Exclusion Zone around Direct-Push Drilling Operations** includes a roughly 30 foot distance from the drilling rig to the edge of the Exclusion Zone. The Zone will be marked in the field using caution tape, and identified by a sign indicating that the area is an Exclusion Zone and PPE is required prior to entry.*

*The **Contamination Reduction Zone** is a designated corridor for workers to enter/exit the Exclusion Zone. It extends from the outer edge of the Exclusion Zone to the inner edge of the Support Zone. This area will be used for Personnel Decontamination, where used PPE can be discarded after exiting the Exclusion Zone. New PPE can be donned prior to entry into the Exclusion Zone from the Support Zone.*


*The **Support Zone** is where all materials, personnel or equipment are staged in support of work in the Exclusion Zone, but are held outside of the Exclusion Zone to reduce congestion in the work area. The support zone is the area outside of the Exclusion Zone and Contamination Reduction Zone, but is typically limited to an area within 100-200 feet of the Exclusion Zone.*

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Site Access/Control

Describe procedures for limiting unauthorized entry to the work zone(s). Describe any security requirements.

Work Zones listed above are demarcated by caution tape and signage to prevent unauthorized entry into the work area. All investigation-derived waste will be containerized and labeled prior to end of work each day.

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Decontamination Procedures

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, ground water or equipment in order to reduce the need for extensive decontamination. Describe personnel and equipment decontamination requirements below. Include information on disposal of used PPE and spent cleaning agents and any equipment or materials needed.

Personnel decontamination procedure:

For direct contact hazards (such as soil sampling with a direct push drilling rig), personnel will be protected from site contaminants using disposable PPE. PPE will be disposed of after use, and will be doffed within the contamination reduction zone.

Equipment decontamination procedure:

Equipment that may encounter site contaminants will be cleaned using a pressure-washer, hand-washed with alconox (or equivalent), or by steam cleaning.

Spill Prevention and Response

The spill program for this project will involve the use of preventative measures in order to reduce the potential for environmental releases. These preventative measures may include the following:

- Equipment inspection;
- Staging equipment on containment pads;
- Secondary containment for fuel storage tanks; and
- General housekeeping practices.

If project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be inspected and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be overpacked into an appropriate container.

Ensure all chemical containers on site are labeled and lids are secured when not in use. When transferring chemicals from one container to another, or when refueling vehicles or equipment, provide containment beneath the transfer point to capture potential spills. Immediately report all chemical spills to the PIC/PM and submit an ECS entry with 24 hours.

Will ERM staff or ERM-hired contractors possess containerized chemicals on the project site? ☐ Yes ☒ No

If the answer to this question is **Yes**, follow the requirements outlined in ERM Procedure [NAM-1123-PR1](#) (*Spill Prevention and Response*).


Waste Management Planning

Will ERM's project activities generate waste materials? ☒ Yes ☐ No

Will ERM undertake some level of contractual responsibility for handling waste for the client? ☒ Yes ☐ No

If the answer to either of these questions is **Yes**, follow the requirements outlined in ERM Procedure [NAM-1122-PR1](#) (*Waste Management Planning*).


Describe any waste reduction/minimization techniques to be used on the site here.

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Confined Space Entry

No entry into permit-required confined spaces is authorized for this project.

Entry into permit-required confined spaces is not typically performed on ERM project or by ERM personnel. If a project task or activity would involve entry into a permit-required confined space or if there is a question as to whether or not a job task or activity involves a permit-required confined space, the PM or FSO will contact the Business Unit H&S Director for assistance prior to entering the confined space. Additional information on confined space entry can be found in ERM Procedure [NAM-1572-PR1](#) (*Confined Space Entry*).

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Emergency Response

The FSO has primary responsibility handling emergency situations. This includes taking appropriate measures to ensure the health and safety of site personnel and the public. The FSO will be responsible for evacuating any person and providing decontamination, and arranging for medical treatment or first aid for any person injured or requiring medical attention. Possible actions may involve the evacuation of personnel from the site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the FSO is not available, the PM/CM or other ERM field staff will assume the FSO's responsibilities. All site personnel will assist as directed by the FSO in case of an emergency.

Use the following sections to describe factors affecting emergency response as well as alarms, muster points, methods of evacuation, and accounting for all team members after the emergency.

Describe any contributing factor potentially initiating emergency response (e.g., process, material, or weather) here.

Emergencies contemplated for this project include severe weather (e.g., tornado), fire, or health-related emergencies.

Describe any lights and/or sounds associated with evacuation here.

There are no site-wide emergency lights.

The Macon-Bibb County Emergency Management Agency maintains a notification system (MBCAlert). During a dangerous situation in Macon-Bibb County, the EMA will use MBCAlert to notify registered participants. When a notification about a potential emergency or disaster situation is issued, a registered participant will receive a message on all their registered cell phones, land lines or email addresses.

For work in individual business facilities or battery limits, workers will be oriented to the specific emergency alerts or indicators for that facility and they will be reviewed with workers during the Daily Safety Meeting, and documented in the Site Safety Meeting Form [NAM-1501-FM1](#).

Describe any emergency drill requirements for contractors on-site here.

Contractors will review the emergency procedures outlined in this HASP and additional instructions provided on the Site Safety Meeting Form. Contractors on-site will acknowledge by signing the HASP and Site Safety Meeting Form(s). There are no additional emergency drill requirements for contractors on-site.

Describe any primary and alternative muster points here.


The primary and alternate muster points are shown in [Figure 2](#). The primary muster point will be the small parking area north of Ennis Rd. The alternate muster point will be the parking lot north of Building106-A.

Describe any site-specific evacuation procedures here.

At the onset of an emergency, all personnel will stop work and proceed to the primary or alternate muster point, as directed by the FSO. The FSO will account for all on-site project personnel and visitors. Once everyone is accounted for, site evacuation may proceed via the primary or alternate evacuation route, identified on [Figure 2](#) (as directed by the FSO).

Describe the methodology to be used for accounting for site visitors here.

All workers and visitors must sign in on roster of the Site Safety Meeting Form. Everyone must sign out if they leave the facility. The Site Safety Meeting Form roster will be used to account for all personnel and visitors.

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Describe any PPE and spill kit requirements here.

PPE is identified on Page 12. Chemical use for the project is not currently anticipated. Spill Response, and Spill Kit Requirements are identified in ERM Procedure NAM-1123-PR1 (Spill Prevention and Response).

Map associated with evacuation attached? ☒ Yes ☐ No

Reporting Emergencies: At the earliest time practicable following the occurrence of the emergency situation, the FSO will contact the PM and ERM Coordinator to advise them of the situation. The PM will then be responsible for promptly informing the following parties about the emergency.

- Injured/involved personnel's supervisor;
- Partner-In-Charge; and
- Client Contact.

In the case of an incident, the FSO, with the cooperation of the Business Unit H&S Director, will promptly begin formal investigation into the root cause.


Restarting work: The FSO will determine when it is safe to resume work at the site following an emergency. Note that if there is any doubt regarding the safe condition of the area, work will not recommence until all safety issues are resolved.

Describe any procedures that may be required prior to work restart here.

Prior to re-starting work, a Safety Meeting will be held and documented on [NAM-1501-FM1](#) (Site Safety Meeting Form)

Emergency Drills: In accordance with the HAZWOPER Standard emergency response plans will be rehearsed regularly as part of the overall training program for site operations. The frequency of this drill (rehearsal) is outlined below. All drills will be documented on the [NAM-1212-FM2](#) (Emergency Drill Evaluation Form). Drills do not need to be elaborate. A table-top scenario during the daily safety meeting is an adequate drill.

Project Duration	Drill Frequency
Less than 30 days	None, cover during review/sign-off of HASP
Greater than one month but less than one year	Once
Greater than one year	Annually

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Site Safety Briefings

Communication and Review of the HASP: An initial review of the site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate HASP details and answer questions to individuals working at the site. The following topics will be addressed during the briefing:

- Names of the FSO and any designated alternate
- Hazardous chemicals that may be encountered during on-site activities
- Physical hazards that may be encountered on-site
- Special training requirements and Safe Work Practices
- Work tasks
- Emergency communication signals, codes, and location of emergency contact information
- Emergency procedures for safety events, fires, and hazardous material incidents
- Emergency evacuation routes

Daily Safety Meeting: A daily safety meeting will be conducted each morning. The daily safety meeting will include a discussion of the following health & safety-related topics, among others:


- Who is doing what, where and how;
- The potential for overlapping site operations;
- Changes to the HASP or JHAs;
- Discussion of recent Incidents or safety observations; and
- Comments from the project personnel.

The meetings will be documented on [NAM-1501-FM1](#) (*Site Safety Meeting Form*).

Auditing and HASP Revisions: Selected project field activities and project files shall be audited periodically. A full site audit for conformance with the HASP will occur at least once per year for projects with field duration of one year or longer. Full site audits may also be conducted for shorter duration projects. See ERM Form [ERM-1941-FM4](#) (*Field Audit Form*).

Project documentation audits may be conducted periodically for shorter term projects. See ERM Form [ERM 1941-FM3](#) (*Project Audit Form*).

Revisions made to the site HASP in response to audit feedback, lessons learned from incidents, or other reasons will be explained to all site personnel at the first daily safety meeting following the institution of the HASP revision.

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Emergency Contacts

All ERM employees are empowered to pause or stop work to address any unsafe acts/conditions, questions, concerns or changed conditions. All work-related safety events should be shared with the project team and promptly entered into the Event Communication System (ECS).

FOR ALL MEDICAL EMERGENCIES, CALL 911 OR THE LOCAL EMERGENCY NUMBER.


For ALL non-emergency incidents resulting in any injury or illness, you must:

- Give appropriate first aid care to the injured or ill individual and secure the scene.
- Immediately notify the PM, PIC, and the H&S Team.
- At direction of PM, PIC, or H&S Team, call WorkCare Incident Intervention at (888) 449-7787 (available 24 hours/7 days per week in US only).
- Clients may have their own procedures which we may need to follow.

For all incidents (injuries, illnesses, spills, fires, property damage, etc.) and significant near misses, enter the event into ECS within 24 hours.

Contact	Name	Location	Phone
Hospital (attach map)	Navicent Health Medical Center	777 Hemlock Street Macon, GA 31201	911 (emergency) 478-633-1000 (non-emergency)
Police	Macon Police Department	700 Poplar Street Macon, GA 31202-2097	911 (emergency) 478-751-7505 (non-emergency)
Fire	Macon-Bibb County Fire Department	1191 First Street Macon, GA 31201	478-751-9180
Poison Control*	Georgia Poison Center	80 Jesse Hill Jr Dr SE PO Box 26066 Atlanta, GA 30303	800-222-1222
Incident Intervention	WorkCare	NA	888-449-7787
Partner-in-Charge	William A. Butler	3200 Windy Hill Rd SE Suite 1500 W Atlanta, GA 30339	678-486-2700
Project Manager	Martin Crook		678-486-2767
Field Manager (if not PM)	see NAM-1501-FM1		see NAM-1501-FM1
Field Safety Officer (if not PM)	see NAM-1501-FM1		see NAM-1501-FM1
SSC Experienced Person	Taylor Payne William Virgo		678-486-2758 678-486-2760
Business Unit H&S Director	Millard Griffin		678-294-8658
Regional H&S Director	Millard Griffin		678-294-8658
Client Contact	Tyler Garrison	Macon-Bibb County Industrial Authority 439 Mulberry St. Macon, Georgia 31201	478-223-0576

* Poison control centers in the US can be contacted at 800-222-1222. In Canada, poison control centers are specific to each province; contact information can be found here: https://safemedicationuse.ca/tools_resources/poison_centres.html.

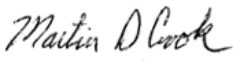

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Acknowledgement

I have read, understood, and agree with the information set forth in this health and safety plan (HASP), and will follow guidance in the plan and in ERM's [Document Control System](#) (DCS). I understand the training and medical monitoring requirements (if any) for conducting activities covered by this HASP and have met these requirements.

ERM has prepared this plan solely for the purpose of protecting the health and safety of ERM employees. Contractors, visitors, and others at the site are required to follow provisions in this document at a minimum, but must refer to the organization's health and safety program for their protection.

Printed Name	Signature	Organization	Date

Approval Signatures <i>Signatures in this section indicate the signing employee will comply with and enforce this HASP, as well as procedures and guidelines established in ERM's DCS. Signatures also indicate that any contractors performing work under contract to ERM have met the minimum safety standards in NAM-1130-PRI (Contractor Management).</i>	Project Manager	Date
	Typed Name: Martin Crook Signature File: 	3/18/2019
	Partner-in-Charge	Date
	Typed Name: William A Butler Signature File: 	3/18/2019

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Appendix B

Check all appropriate documents to be attached to this HASP.

<input checked="" type="checkbox"/> Site-specific JHAs for all tasks (including contractors)	<input checked="" type="checkbox"/> Map of route to hospital with turn-by-turn instructions
<input checked="" type="checkbox"/> Subsurface Clearance (SSC) Project Plan Form	<input checked="" type="checkbox"/> SNAP Cards
<input checked="" type="checkbox"/> Site Safety Meeting Form (NAM-1501-FM1)	<input checked="" type="checkbox"/> Field Audit Form (ERM-1941-FM4)
<input checked="" type="checkbox"/> Vehicle Inspection Forms (ERM-1430-FM2)	<input type="checkbox"/> Industrial Hygiene Sample Data (NAM-1302-FM1)
<input checked="" type="checkbox"/> Journey Management Plans (ERM-1430-FM1)	<input checked="" type="checkbox"/> Ambient Air Monitoring Form (NAM-1302-FM2)
<input checked="" type="checkbox"/> Safety Data Sheets (SDS) for chemicals brought to site	<input type="checkbox"/> Client-specific requirements
<input type="checkbox"/> PLAN Risk Assessment	<input checked="" type="checkbox"/> Other: Miscellaneous Field Forms
<input checked="" type="checkbox"/> Facility site map(s)	<input type="checkbox"/> Other:

Appendix C - Applicable ERM Safety Standards/Procedures


Check all that procedures/standards that are applicable to this project. Refer to the standards/procedures for guidance and, where applicable, use forms, work instructions, and guideline documents associated with these standards/procedures in the completion of site work. Copies of all standards/procedures must be procured from ERM's Document Control System.

Global Standards/Procedures

<input type="checkbox"/> Short Service Employees (ERM-1611-PR1)	<input type="checkbox"/> Travel Risk Assessment (ERM-1410-ST1)
<input type="checkbox"/> Offshore Platform Safety (ERM-1531-ST1)	<input checked="" type="checkbox"/> Subsurface Clearance Standard (ERM-1511-ST1)
<input checked="" type="checkbox"/> Driver and Vehicle Safety (ERM-1430-PR1)	<input type="checkbox"/> Fixed Wing Aircraft/Helicopter Standard (ERM-1440-ST1)

Regional Standards/Procedures

<input checked="" type="checkbox"/> Fire Prevention (NAM-1213-PR1)	<input type="checkbox"/> Demolition (NAM-1544-PR1)
<input type="checkbox"/> Confined Space Entry (NAM-1572-PR1)	<input type="checkbox"/> Excavation and Trenching (NAM-1512-PR1)
<input type="checkbox"/> Fall Protection (NAM-1313-PR1)	<input checked="" type="checkbox"/> Hazard Communication (NAM-1301-PR1)
<input type="checkbox"/> Ladder Safety (NAM-1521-PR1)	<input checked="" type="checkbox"/> Cold Stress (NAM-1323-PR1)
<input checked="" type="checkbox"/> Hearing Conservation (NAM-1312-PR1)	<input checked="" type="checkbox"/> Heat Stress (NAM-1323-PR2)
<input checked="" type="checkbox"/> Incident Reporting and Investigation (NAM-1220-PR1)	<input type="checkbox"/> Medical Services (NAM-1840-PR1)
<input type="checkbox"/> Medical Surveillance (NAM-1810-PR1)	<input checked="" type="checkbox"/> Personal Protective Equipment (NAM-1310-PR1)
<input type="checkbox"/> Hot Work (NAM-1542-PR1)	<input checked="" type="checkbox"/> Respiratory Protection (NAM-1311-PR1)
<input checked="" type="checkbox"/> Blood-borne Pathogens (NAM-1325-PR1)	<input checked="" type="checkbox"/> Contractor Management (NAM-1130-PR1)
<input checked="" type="checkbox"/> Hand Tools/Portable Power Equipment (NAM-1329-PR1)	<input checked="" type="checkbox"/> Insect Bite Prevention Standard (NAM-1361-ST1)
<input type="checkbox"/> Electrical Safety (NAM-1561-PR1)	<input checked="" type="checkbox"/> Incident/Illness Management (NAM-1210-PR1)
<input type="checkbox"/> Waste Management Planning (NAM-1122-PR1)	<input type="checkbox"/> Energy Isolation (NAM-1562-PR1)

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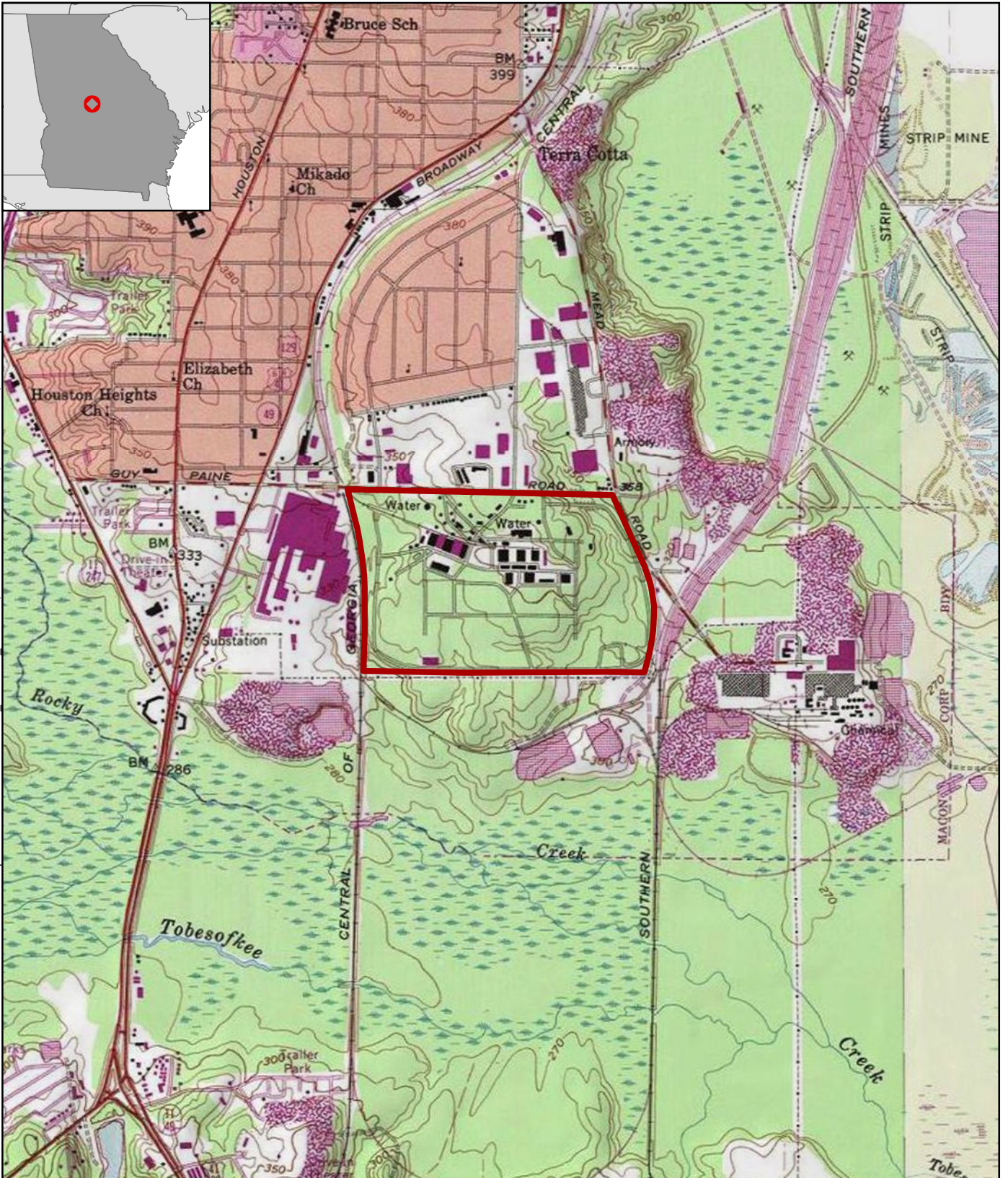
<input type="checkbox"/> Work Over Water (NAM-1460-PR1)	<input type="checkbox"/> Spill Prevention and Response (NAM-1123-PR1)
<input type="checkbox"/> Fatigue Management (NAM-1328-PR1)	<input checked="" type="checkbox"/> Safe Use of Cutting Tools (NAM-1324-PR1)
<input type="checkbox"/> Lone Worker (NAM-1326-PR1)	<input type="checkbox"/> Compressed Gas Cylinders (NAM-1341-PR1)
See It; Own It; Share It	Stop Work Authority
<p>It means that:</p> <ul style="list-style-type: none"> • We know that we have a responsibility to look out for each other, to intervene when necessary, to be proactive and to help keep safety issues from becoming problems. • We also look out for ourselves. If we recognize that a situation is unsafe, we are expected to stop what we're doing, reassess the situation and consult with others if necessary before proceeding safely. • We assign no blame to anyone who raises safety issues. • We strive to learn lessons from the large and small events that are part of our daily experience. 	<p>It is ERM policy that all ERM and ERM Contractor employees have the authority, without fear of reprimand or retaliation to:</p> <ul style="list-style-type: none"> • Immediately stop any work activity that presents a danger to the site team or the public. • Get involved, question and rectify any situation or work activity that is identified as not being in compliance with the HASP or with broader ERM health and safety policies. • Report any unsafe acts or conditions to supervision or, preferably, intervene to safely correct such acts or conditions themselves.

FIELD SAMPLING PLAN

Macon Naval Ordnance Plant Superfund Site (GAD003302676)
Macon, Georgia

ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.

FIGURES



Legend

 Site Boundary



N



0 3,000

Feet

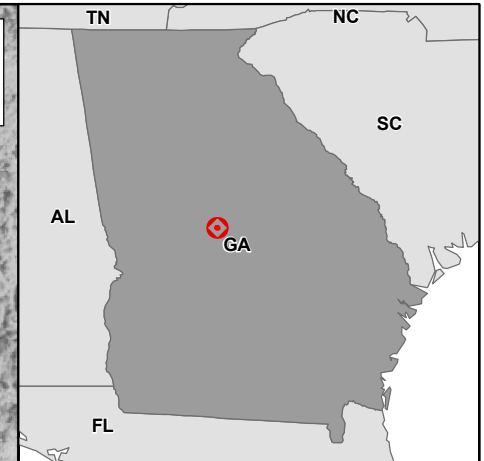
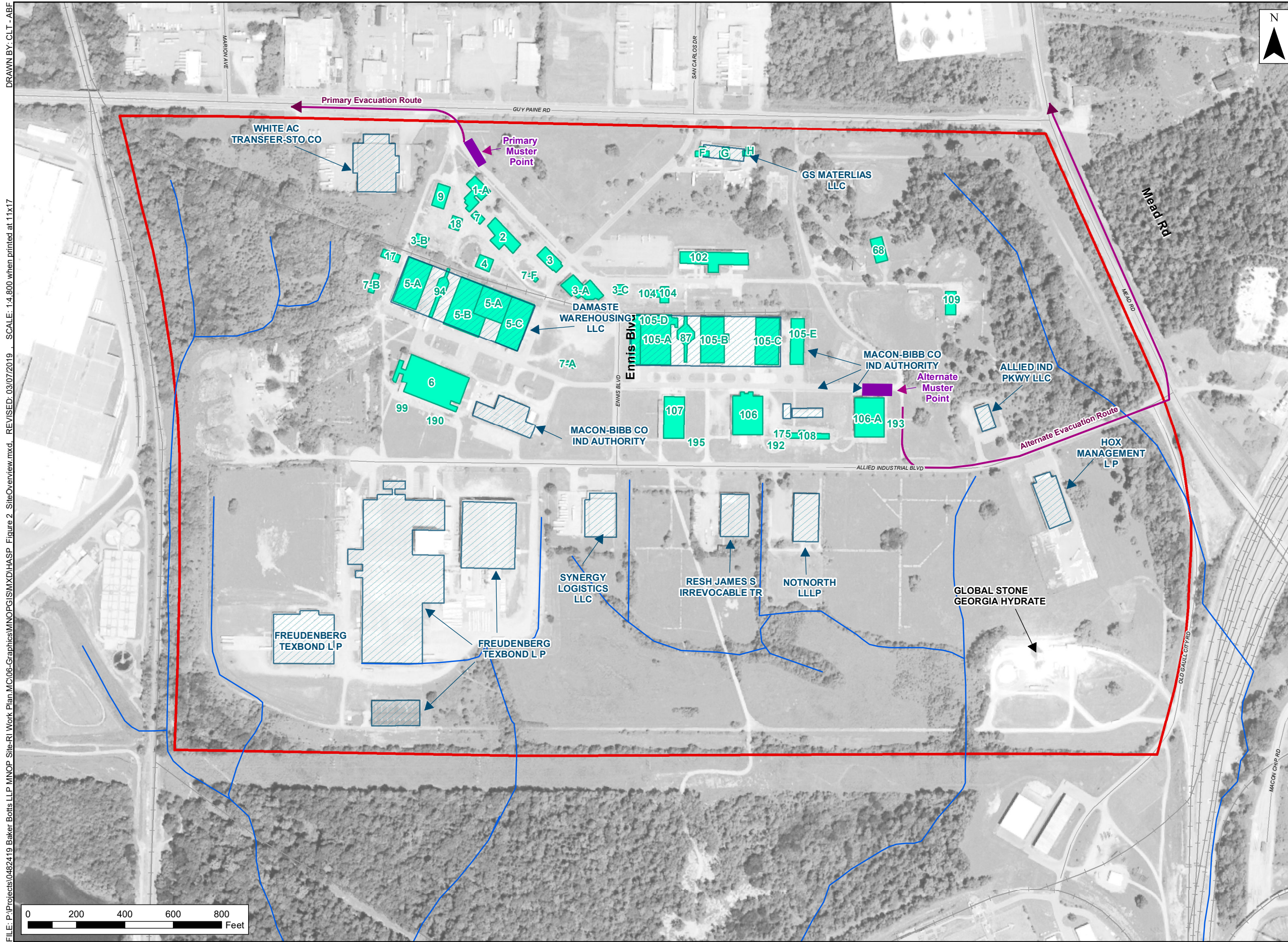
1:24,000 1 inch = 2,000 feet

Figure 1

Site Location Map

RI/FS Work Plan
Macon Naval Ordnance
Plant Superfund Site
Bibb County, Georgia

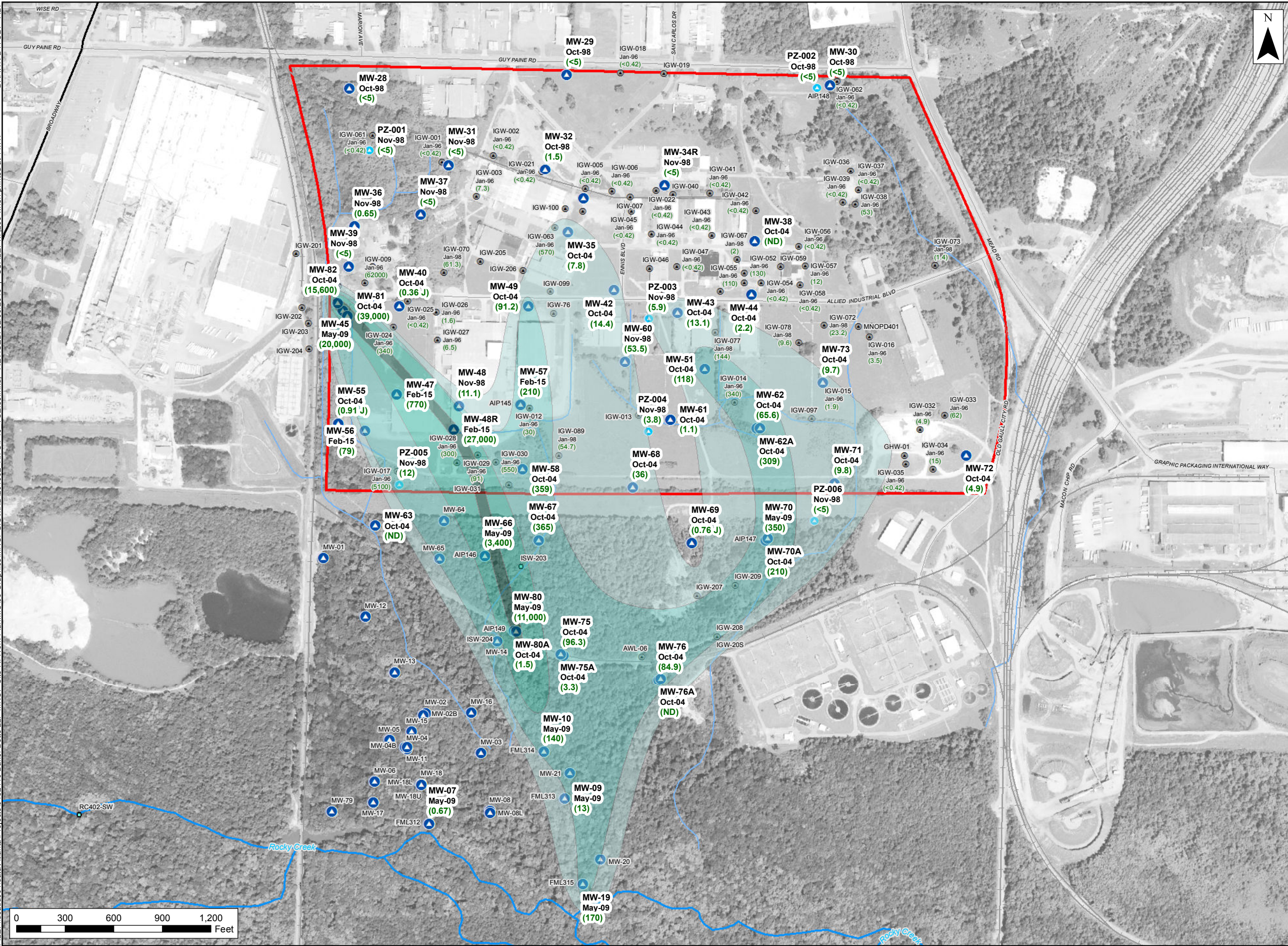
FILE: P:\Projects\0482419 Baker Botts LLP MNOP Site-RI Work Plan\MC106-Graphics\MNOPGIS\MXD\HASP Figure 2 SiteOverview.mxd, REVISED: 03/07/2019, SCALE: 1:4,800 when printed at 11x17



- Legend**
- Site Boundary
 - Macon Naval Ordinance Plant Structure
 - Building added post 1980
 - Muster Point
 - Evacuation Route
 - Site Drainage

Figure 2
Site Overview
RI/FS Work Plan
Macon Naval Ordnance
Plant Superfund Site
Bibb County, Georgia

FILE: \\usatl001\data\Atlanta\Projects\0482419 Baker Botts LLP MNOP\GIS\MXD\201902 RIFS\F40 TCEIso.mxd REVISED: 02/06/2019 SCALE: 1:7,200 when printed at 11x17 DRAWN BY: CLT - ABF



Legend

- Site Boundary
- River / Stream
- Site Drainage
- Monitoring well
- Piezometer
- Temporary Well
- Surface Water

TCE Isoconcentration Contours

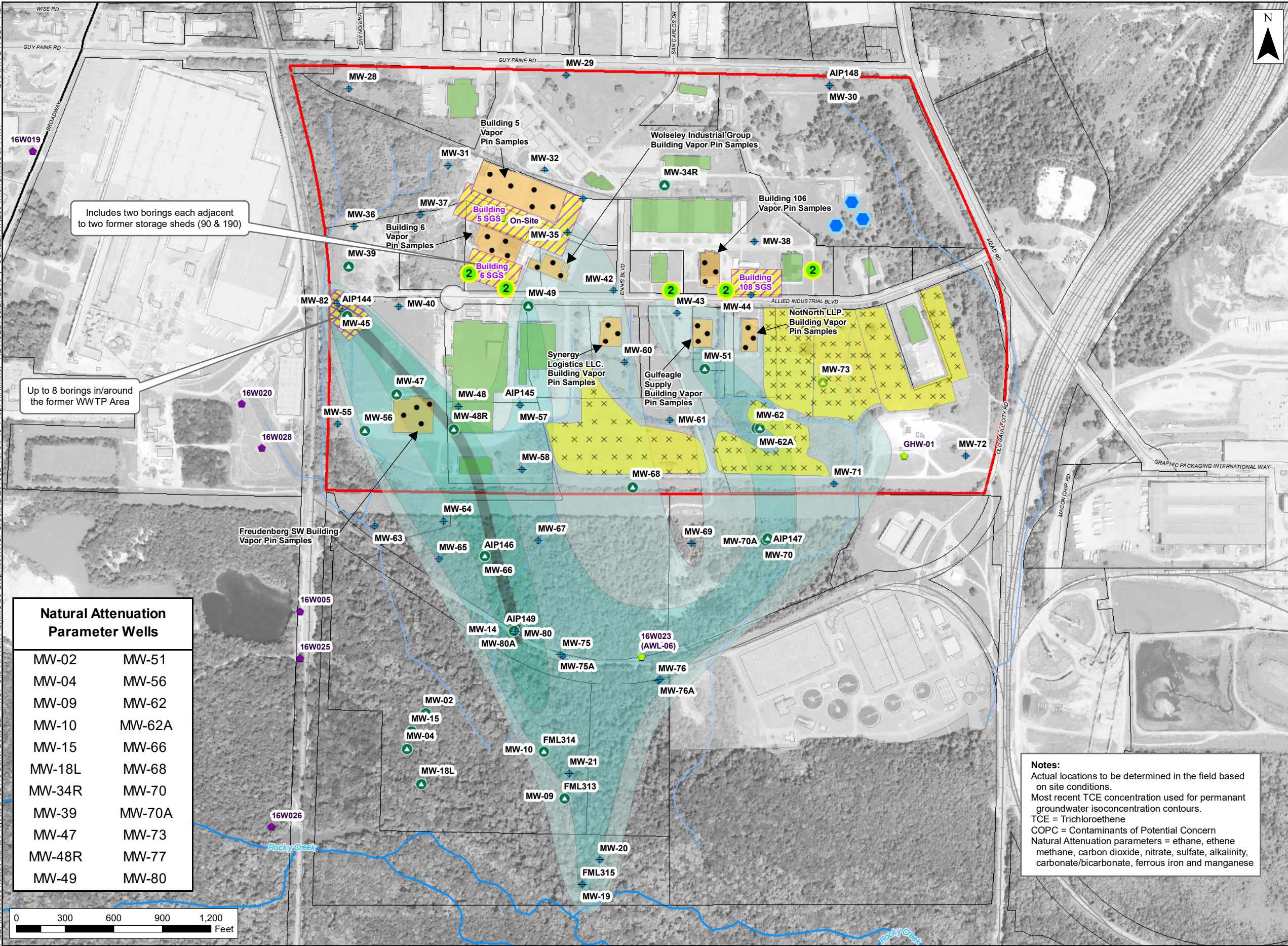
- > 5,000 ug/L
- > 500 ug/L
- > 50 ug/L
- > 5 ug/L

(359) = Monitor Well Concentration
(570) = Temporary Point Concentration

Notes:
Most recent concentration of trichloroethene (TCE) shown for each groundwater sample location.
Date of sample collection provided for each location.
Concentrations shown in ug/L (micrograms per liter).

Figure 3
Trichloroethene
Isoconcentration Contours
[Most Recent]
RI/FS Work Plan
Macon Naval Ordnance
Plant Superfund Site
Bibb County, Georgia

FILE: \\usatl001\data\Atlanta\Projects\0482419 Baker Botts LLP MNOP Site-RI\Work Plan\MCO6-Graphics\MNOPSIS\MXD\201902 RIFS\F46 Prop\RI\mxd. REVISED: 08/27/2019. SCALE: 1:7,200 when printed at 11x17. DRAWN BY: CLT - ABF



Legend

- Site Boundary
- River / Stream
- Site Drainage
- Water Supply Wells to be sampled for COPCs
- Other Water Supply Wells

TCE Isoconcentration Contours

- > 5,000 ug/L
- > 500 ug/L
- > 50 ug/L
- > 5 ug/L

Proposed Sample Locations

- Two DPT Borings Adjacent to each Former Solvent Storage Shed
- Proposed Surface PCB Sample Location (shallow)
- Wells to be Sampled for COPCs
- Wells to be Sampled for COPCs and Natural Attenuation Parameters
- Proposed Area of Passive Soil Gas Survey & DPT Investigation
- Proposed Area of DPT
- Building no longer exists
- Building excluded from further VI evaluation
- Building included for further VI evaluation
- Proposed co-located indoor air and sub-slab soil gas sample location
- Proposed Shallow Soil Sampling Unit
- 30 Increments per unit (0-6in)

Figure 4
Proposed Phase I
Remedial Investigation
Health and Safety Plan
Macon Naval Ordnance Plant
Superfund Site
Bibb County, Georgia

Environmental Resources Management
www.erm.com

APPENDIX A JOB HAZARD ANALYSES



JHA Job Hazard Analysis

S1-ERM-002-FM4 - JHA Template
Version: 1.1

Project Number:	482419	Project / Client Name:	Macon Naval Ordnance Plant Superfund Site
Project Manager:	Martin Crook	Location:	Macon, Georgia
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/19 Rev 0

SPECIFIC TASK:	Site Reconnaissance
----------------	---------------------

Minimum Required PPE for Entire Task:	<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input type="text" value="<enter type and cartridge type>"/> <input type="checkbox"/> Other (specify): <input type="text" value="<enter additional PPE here>"/>		
	<input checked="" type="checkbox"/> Safety Glasses <input checked="" type="checkbox"/> Reflective Vest <input type="checkbox"/> Gloves <input type="text" value="<enter type here>"/> <input checked="" type="checkbox"/> PPE clothing <input type="text" value="Long pants"/>		
Additional Task-Step Specific PPE: (as indicated below under Controls)	Hearing Protection and gloves. As needed	Equipment / Tools Required:	none
Training Required for this Task:	Site contact to provide summary of site H&S for individual facilities	Permits Required for this Task:	none
Forms Associated with This Task:			

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. <u>Signature/Date:</u>
Martin Crook / Project Manager			

Task Steps ¹	Potential Hazards & Consequences ²	select	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
1 Site walk, interior of building	1a Slips and trips associated with uneven floors or materials stacked on floors		Unlikely	Medium	4	Identify safe pathways. Ensure steps, walkways, and shoes are not slippery or loose prior to use. Keep eyes on path and nearby surroundings when walking. Walk slowly around corners and when entering/exiting doors.
	1b Collision with forklifts or other heavy equipment		Rare	Minor	1	Stay on designated foot paths. Walk slowly around corners and when entering/exiting doors or crossing aislesways. Listen for horns or sounds of equipment moving.
	1c Injuries to hands or legs from sharp edges or other pinch points on machinery		Unlikely	Medium	4	Scan area while walking for posted signs and obey signage. Do not place fingers in ends of piping or other tubular material or near operating machinery.
	1d Impact with low-hanging objects		Unlikely	Medium	4	Identify safe pathways. Scan area while walking. Be aware of any hanging or low equipment and avoid. Watch for posted sign or painted pipes/equipment and obey signage.
	1e High noise level		Rare	Minor	1	Wear hearing protection in any area where warning signs posted. Rule of thumb is that you should be able to hear a person talking to you in a normal voice at 1m/3 ft. If you cannot hear them without them raising their voice the hearing protection is necessary, and noise monitoring is advisable.
2 Site walk, exterior of building	2a Fall from elevated position		Rare	Minor	1	Ensure steps, ladder rungs and shoes are not slippery or loose. Do not stand or work off top of ladder (e.g. top 2 steps of stepladder). Do not overreach; keep body between ladder rails and both feet on same rung. Stand only on secured and inspected flooring and uprights.
	2b Collision with cars or trucks		Rare	Minor	1	Check in with on-site staff to determine when truck/car traffic will be lightest. Wear High-visibility safety vests: Stay on sidewalks or other pedestrian pathways as much as feasible. Use a spotter if it's necessary to walk in roadways. Perform work when trucks are not scheduled to be arriving/leaving.

Task Steps ¹		Potential Hazards & Consequences ² <small>select</small>			Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
		2c	Collision with rail cars		Rare	Minor	1	Check in with on-site staff to determine if rail cars are likely to be moving and schedule work around this schedule. Wear High-visibility safety vests: Stay off rails. Use a spotter if it's necessary to walk on railline.
		2d	Slips and trips associated with uneven surfaces or stacked materials on ground		Rare	Minor	1	Identify safe pathways. Ensure steps, walkways, and shoes are not slippery or loose prior to use. Keep eyes on path and nearby surroundings when walking. Walk slowly around corners and when entering/exiting doors.

ONE JHA PER TASK. CONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.
 INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT.
 LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

- Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
- List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use numbers and letters for each hazard/impact listed (1a, 1b, etc). Hazards should be described in terms of their specific origin and negative consequences (e.g., instead of "moving equipment", write "injury from getting struck by forklift").
- Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use numbers and letters corresponding to listed hazards.
- Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].
A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE



JHA Job Hazard Analysis

ERM-1115-FM1 - JHA Template
Version: 1.3

Project Number:	482419	Project / Client Name:	Macon Naval Ordnance Plant Superfund Site
Project Manager:	Martin Crook	Location:	Macon, GA
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/2019 Rev 0

SPECIFIC TASK:	Soil Gas Survey Point Installation
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Minimum Required PPE for Entire Task:	<input type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input type="text" value="<enter type and cartridge type>"/> <input type="checkbox"/> Other (specify): <input checked="" type="checkbox"/> Safety Glasses <input type="checkbox"/> Reflective Vest <input checked="" type="checkbox"/> Gloves <input type="text" value="Cushioned"/> <input checked="" type="checkbox"/> PPE clothing <input type="text" value="Dust Mask"/> <input type="text" value="<enter additional PPE here>"/>		
Additional Task-Step Specific PPE: (as indicated below under Controls)	NA	Equipment / Tools Required:	Hammer Drill, Generator
Training Required for this Task:	40 HR HAZWOPER, SSC EP	Permits Required for this Task:	NA
Forms Associated with This Task:	SSC + SSC Waiver for hand clearance		

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. <u>Signature/Date:</u>
Taylor Payne/ Geologist			
Martin Crook / Project Manager			

Task Steps ¹	Potential Hazards & Consequences ²	select	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
1 Transporting Equipment to sample locations	1a Mustle strain	H&S	Possible	Medium	8	1a cart for equipment when possible
	1b slips trips falls	H&S	Likely	Minor	5	1a proper lifting techniques, breaks, switching carrying responsibilities 1b survey walking path, don't rush, steel toes
2 Installing SGS sample	2a electrical	H&S	Unlikely	Significant	8	2a Precheck equipment, GFCI, regular cord checks for fraying, keep cord dry
	2b eye hazard	H&S	Unlikely	Minor	2	2b safety glasses
	2c hand injury - ergonomic	H&S	Possible	Minor	4	2c cushioned gloves, switch off installion duties
	2d burns - generator & drill bits	H&S	Possible	Minor	4	2d gloves, allow bits to cool as nescessary, position generator exhaust away
	2e drill injury from losing control	H&S	Possible	Serious	12	2e steel toes, proper base/stance, communication with team,
	2f respirable crystalline silica	H&S	Possible	Major	20	2f dust clllector will be used while operating hammer drill. Dust mask will also be worn
3 Retrieving sample	3a hand injury	H&S	Possible	Minor	4	3a wear proper hand protection

ONE JHA PER TASK. CONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.
INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT.
LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

- Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
- List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use numbers and letters for each hazard/impact listed (1a, 1b, etc). Hazards should be described in terms of their specific origin and negative consequences (e.g., instead of "moving equipment", write "injury from getting struck by forklift").
- Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use numbers and letters corresponding to listed hazards.
- Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].
A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE



JHA Job Hazard Analysis

ERM-1115-FM1 - JHA Template
Version: 1.3

Project Number:	482419	Project / Client Name:	Macon Naval Ordnance Plant Superfund Site
Project Manager:	Martin Crook	Location:	Macon, Georgia
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/19 Rev 0

SPECIFIC TASK:	Soil Sampling
----------------	---------------

Minimum Required PPE for Entire Task:	<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input checked="" type="checkbox"/> Hearing Protection <input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input <input="" type="checkbox" value=" <enter type and cartridge type> "/> Other (specify): <input <="" td="" type="text" value=" <enter additional PPE here> "/>		
	<input checked="" type="checkbox"/> Safety Glasses <input checked="" type="checkbox"/> Reflective Vest <input checked="" type="checkbox"/> Gloves <input <input="" checked="" type="checkbox" value=" latex; leather "/> PPE clothing <input <="" td="" type="text" value=" permethrin treated clothing "/>		
Additional Task-Step Specific PPE: (as indicated below under Controls)	N/A	Equipment / Tools Required:	Multi parameter field meter, PID
Training Required for this Task:	40 hour OSHA, SSC EP, CPR/First Aid	Permits Required	None
Forms Associated with This Task:			

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. <u>Signature/Date:</u>
Taylor Payne/ Associate Geologist			
Martin Crook / Project Manager			

Task Steps ¹	Potential Hazards & Consequences ²	select	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
1 Collecting Soil Samples	1a Cut by broken glass	H&S	Possible	Medium	8	1a Inspect sample containers before placing samples in them, wear appropriate PPE, including leather gloves where needed.
	1b Chemical Exposure	H&S	Unlikely	Minor	2	1b Wear appropriate PPE, screen soil with PID
	1c Back injury lifting cooler	H&S	Possible	Medium	8	1c Use proper lifting techniques, use team lift techniques where appropriate. If possible, stage coolers where mechanical assistance can be used to move them.
	1d Back injury using hand auger	H&S	Possible	Medium	8	1d Rotate tasks, stretch before and after and avoid twisting at the waist or sharp, sudden movements.

ONE JHA PER TASK. CONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH. INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT. LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

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- List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use numbers and letters for each hazard/impact listed (1a, 1b, etc). Hazards should be described in terms of their specific origin and negative consequences (e.g., instead of "moving equipment", write "injury from getting struck by forklift").
- Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use numbers and letters corresponding to listed hazards.
- Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].
A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE



JHA Job Hazard Analysis

Project Number:	482419	Project / Client Name:	Macon Naval Ordnance Plant Superfund Site
Project Manager:	Martin Crook	Location:	Macon, Georgia
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/19 Rev 0

SPECIFIC TASK:	Direct Push Soil and Groundwater Sampling		
Minimum Required PPE for Entire Task:	<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input checked="" type="checkbox"/> Hearing Protection <input checked="" type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input type="text" value="<enter type and cartridge type>"/> <input type="checkbox"/> Other (specify): <input type="text" value="<enter additional PPE here>"/>		
Additional Task-Step Specific PPE: (as indicated below under Controls)	Leather gloves are required while handling equipment/ materials and while using hand tools	Equipment / Tools Required:	Drill rig, hand tools
Training Required for this Task:	ERM SSC FSO, OSHA 40hr HAZWOPER	Permits Required for this Task:	
Forms Associated with This Task:	Project Specific Level 3 HASP, SSC paperwork, Daily Tailgate Meeting form		

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field Safety Officer (FSO) to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. FSO Signature/Date:
Andreas Shoredits / Staff Geologist			
Victoria Thomas/ Staff Scientist			

Task Steps ¹	Potential Hazards & Consequences ²	<div style="text-align: center;">select ↓</div>	Likelihood	Severity	RISK	Controls to Eliminate or Reduce Risks ³
1 Conduct ERM SSC procedures	1a Biological Hazards/ adverse weather conditions causing hazard to H&S	H&S	4	4	16	1a Track weather with portable phone, plan a rally point in case of inclement weather approaches, apply sunscreen and limit exposure, drink water at all stops in work,
	1b Strike Utility (during manual clearance)	multiple	1	5	5	1b use proper tools for clearance, proceed slowly and remain in areas cleared by utility locate services, note all marked utilities and remain outside of critical zones
	1c Slip Trip And Fall	H&S	3	2	6	1c Identify and use only safe pathways and stairs when entering/exiting/working in area, Inspect work area for potential slip/trip/fall obstructions prior to start of work and remove or, if not possible, mark with highly visible tape/flags, etc., Keep work area organized and free of surface obstructions during task.
2 Oversee Drilling Services	2a Biological Hazards/ weather conditions	H&S	4	4	16	2a Track weather with portable phone, plan a rally point in case of inclement weather approaches, apply sunscreen and limit exposure, drink water at all stops in work,
	2b Injury due to contact with rig	multiple	3	4	12	2b Wear proper PPE, use proper lifting techniques, driller should conduct "checks" to ensure personnel are out of the way of the equipment before operating.
	2c Strike underground utility causing property damage or injury	multiple	1	5	5	2c use proper tools for clearance, proceed slowly and remain in areas cleared by utility locate services, note all marked utilities and remain outside of critical zones
	2d Injury caused by improperly lifting equipment	H&S	3	4	12	2d Wear proper PPE, use proper lifting techniques
	2e Injury due to vehicle and train traffic in and around the site	multiple	2	5	10	2e Follow traffic signals when cross the street. Watch for cars behind blind corners. Use sidewalks and pedestrian crossings. Use safety cones to identify work areas. Wear high visibility vests. Identify a spotter to watch for cars approaching the work area. Be observant of active railway traffic when driving over crossings

ONE JHA PER TASK. SUBCONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.

1. Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
2. List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use
3. Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use
4. Select the likelihood of occurrence and severity of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE



JHA Job Hazard Analysis

ERM-1115-FM1 - JHA Template
Version: 1.4
Revision Date: 28 April 2017

Project Number:	482419	Project / Client Name:	Macon Naval Ordnance Plant Superfund Site
Project Manager:	Martin Crook	Location:	Macon, Georgia
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/2019 Rev 0

SPECIFIC TASK:	Vapor Pin Installation (Concrete)
----------------	-----------------------------------

Minimum Required PPE for Entire Task:	<input type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input checked="" type="checkbox"/> Hearing Protection <input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input type="text" value="<enter type and cartridge type>"/> <input checked="" type="checkbox"/> Other (specify): <input type="checkbox"/> Safety Glasses <input type="checkbox"/> Reflective Vest <input checked="" type="checkbox"/> Gloves <input type="text" value="Cushioned"/> <input checked="" type="checkbox"/> PPE clothing <input type="text" value="Long Pants"/> <input type="text" value="Dust Mask"/>
Additional Task-Step Specific PPE: (as indicated below under Controls)	Equipment / Tools Required: Hammer Drill, Hammer
Training Required for this Task: OSHA 40hr HAZWOPER	Permits Required for this Task: Include both safety permits (e.g., Hot Work) and environmental permits (eg, drilling permit)
Forms Associated with This Task:	SSC Plan

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. <u>Signature/Date:</u>
Brad Griffith / Staff Geologist			
Martin Crook / Project Manager			

Task Steps ¹	Potential Hazards & Consequences ²	select	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
1 Drill hole through concrete with hammer drill	1a eye hazard - concrete cuttings / dust	H&S	Heard of	Serious	9	1a PPE - eye goggles
	1b burns - Tool accessories can get hot during use	H&S	Unlikely	Serious	6	1b Avoid contact with skin (wear long pants and long sleeves, use a cloth to remove accessories)
	1c hearing hazard	H&S	Heard of	Medium	6	1c PPE - Hearing protection
	1d hand injury - ergonomic	H&S	Heard of	Serious	9	1d PPE - wear cushioned gloves to reduce vibration
	1e Injury from moving parts - drill bit	H&S	Heard of	Significant	12	1e Procedure - always use two hands one on each handle for maximum control PPE - Steel Toed Boots, no loose clothing Engineering - Use stainless steel drilling guide
	1f Inhalation of dust	H&S	Possible	Serious	12	1f PPE - dust mask, Engineering - Use dust collector while operating hammer drill
	1g electrical shock hazard	H&S	Unlikely	Significant	8	1g Engineering - Don't expose power tools to rain or wet conditions Engineering - Use GFCI (portable if not available in equipment). Procedure - always inspect electrical cord to make sure it is in good condition (no cracks, exposed wires, dry rot)
2 Clean hole out with brush	2a dust - eye + inhalation	H&S	Possible	Minor	4	2a PPE - eye goggles + dust mask
3 Hammer in vapor pin	3a hand injury - pinch points	H&S	Heard of	Serious	9	3a PPE - appropriate protective gloves 3b Engineering - always use installation tool to hammer in vapor points safely
4 Insert vapor pin cap	4a release of vapors from subsurface	E				4a Engineering - cap will prevent vapors from escaping through pin
5 Insert stainless steel secured cover	5a prevent outside tampering with vapor point	S				5a Engineering - the secured cover diminishes visibility of the pin and inhibits access to prevent tampering with the installed pin

ONE JHA PER TASK. CONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.

- Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
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- Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use numbers
- Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE



JHA Job Hazard Analysis

ERM-1115-FM1 - JHA Template
Version: 1.4
Revision Date: 28 April 2017

Project Number:	482419	Project / Client Name:	Macon Naval Ordnance Plant Superfund Site
Project Manager:	Martin Crook	Location:	Macon, Georgia
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/19 Rev 0

SPECIFIC TASK:	Groundwater Monitoring Well Sampling (Low-Flow Purge)
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Minimum Required PPE for Entire Task:	<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input type="text" value="<enter type and cartridge type>"/> <input type="checkbox"/> Other (specify): <input checked="" type="checkbox"/> Safety Glasses <input checked="" type="checkbox"/> Reflective Vest <input type="checkbox"/> Gloves <input type="text" value="<enter type here>"/> <input checked="" type="checkbox"/> PPE clothing <input type="text" value="Long Pants"/> <input type="text" value="<enter additional PPE here>"/>		
Additional Task-Step Specific PPE: (as indicated below under Controls)	Nitrile gloves are required while handling sample bottles with preservatives.	Equipment / Tools Required:	Sampling equipment, hand tools
Training Required for this Task:	ERM FSO, OSHA 40hr HAZWOPER	Permits Required for this Task:	Client Site Specific (See DSM Site Contact to obtain req. permits)
Forms Associated with This Task:	Site Specific Level 2 HASP		

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. <u>Signature/Date:</u>
Brad Griffeth / Staff Geologist			
Martin Crook / Project Manager			

Task Steps ¹	Potential Hazards & Consequences ²	<div>select ↓</div>	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
1 Transferring sampling equipment from car to well site	1a Biological Hazards	H&S	Possible	Significant	16	1a Avoid walking through tall grass. Look out for spiders, stinging insects, etc. under well covers, in branches, and building eaves. Avoid contact and do not spray with insect killer. Apply bug repellent to avoid biting insects (mosquitoes, tick, gnats, etc.).
	1b injury caused by improperly lifting equipment	H&S	Possible	Significant	16	1b Bring vehicle as close as safely possible to well site, avoid long walks, carry small amount at a time and make multiple trips, use proper lifting techniques and buddy system for heavier equipment.
	1c Slip Trip And Fall	H&S	Heard of	Medium	6	1c Identify and use only safe pathways and stairs when entering/exiting/working in area, inspect work area for potential slip/trip/fall obstructions prior to start of work and remove or, if not possible, mark with highly visible tape/flags, etc., Keep work area organized and free of surface obstructions during task.
2 Filling sample bottles	2a Contact with preservative (acid) while filling sample containers	H&S	Heard of	Serious	9	2a Keep sample bottles away from body when filling, wear nitrile gloves while filling sample bottles.
	2b Cut from broken glass container	H&S	Heard of	Significant	12	2b Keep sample bottles in secure storage container with padding (bubble wrap, etc.), inspect bottles for cracks or breaks before using, discard of broken bottles in appropriate container immediately upon identification.
	2c Cutting by, while cutting tubing	H&S	Heard of	Medium	6	2c Cut tubing using proper tubing cutter. No fixed open blades.
3 Sample Preservation	3a Contact with preservative (acid) while filling sample containers	H&S	Heard of	Serious	9	3a Keep sample bottles away from body when filling, wear nitrile gloves while filling sample bottles.
	3b Cut from broken glass container	H&S	Heard of	Significant	12	3b Keep sample bottles in secure storage container with padding (bubble wrap, etc.), inspect bottles for cracks or breaks before using, discard of broken bottles in appropriate container immediately upon identification.
4 Housekeeping	4a Unintended contact or exposure	multiple	Heard of	Serious	9	4a Label storage and disposal containers using marker or name tags (tape). Keep materials in separate containers that are incompatible. Gasoline should be kept in safety cans only - no plastic containers.
	4b Slip Trip And Fall Caused by Clutter	H&S	Heard of	Medium	6	4b Keep all work areas neat including but not limited to staging areas, office space, worksites and vehicles. Keep items out of walkways and work areas as possible. Remove trash and discarded materials before moving onto another task. Make a final look back at the work area before leaving space to determine nothing is left behind.

ONE JHA PER TASK. CONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.

- Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
- List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use numbers and
- Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use numbers
- Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE



JHA Job Hazard Analysis

ERM-1115-FM1 - JHA Template
Version: 1.4
Revision Date: 28 April 2017

Project Number:	482419	Project / Client Name:	Macon Naval Ordnance Plant Superfund Site
Project Manager:	Martin Crook	Location:	Macon, Georgia
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/2019 Rev 0

SPECIFIC TASK:	Goundwater Monitoring Well Sampling (PDB)
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Minimum Required PPE for Entire Task:	<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input type="text" value="<enter type and cartridge type>"/> <input type="checkbox"/> Other (specify): <input checked="" type="checkbox"/> Safety Glasses <input checked="" type="checkbox"/> Reflective Vest <input type="checkbox"/> Gloves <input type="text" value="<enter type here>"/> <input checked="" type="checkbox"/> PPE clothing <input type="text" value="Long Pants"/> <input type="text" value="<enter additional PPE here>"/>		
Additional Task-Step Specific PPE: (as indicated below under Controls)	Nitrile gloves are required while handling sample bottles with preservatives.	Equipment / Tools Required:	Sampling equipment, hand tools
Training Required for this Task:	ERM FSO, OSHA 40hr HAZWOPER	Permits Required for this Task:	Client Site Specific (See DSM Site Contact to obtain req. permits)
Forms Associated with This Task:	ERM Site Specific Level 2 HASP		

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. <u>Signature/Date:</u>
Brad Griffeth / Staff Geologist			
Martin Crook / Project Manager			

Task Steps ¹	Potential Hazards & Consequences ²	select	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
1 Vehicle travel to (and from) site	1a Adverse weather conditions causing hazard to H&S	H&S	Possible	Significant	16	1a Track weather with portable phone, do not drive into areas with severe storm warnings, stop driving and remain in vehicle if weather becomes hazardous.
	1b Conjested traffic	H&S	Possible	Significant	16	1b Defensive driving per ERM provided training.
2 Transferring sampling equipment from car to well site	2a Biological Hazards/ weather conditions	H&S	Heard of	Significant	12	2a Track weather with portable phone, plan a rally point in case of inclement weather approaches, apply sunscreen and limit exposure, drink water at all stops in work.
	2b injury caused by improperly lifting equipment	H&S	Possible	Serious	12	2b Bring vehicle as close as safely possible to well site, avoid long walks, carry small amount at a time and make multiple trips, use proper lifting techniques and buddy system for heavier equipment.
	2c Slip Trip And Fall	H&S	Heard of	Medium	6	2c Identify and use only safe pathways and stairs when entering/exiting/working in area, inspect work area for potential slip/trip/fall obstructions prior to start of work and remove or, if not possible, mark with highly visible tape/flags, etc., Keep work area organized and free of surface obstructions during task.
3 Bailing Purge Water	3a Repetitive Motion	H&S	Heard of	Serious	9	3a Takes breaks as necessary.
	3b Weight fatigue	H&S	Possible	Serious	12	3b Use proper posture and proper bailing technique. Takes breaks as necessary.
4 Filling sample bottles	4a Contact with presevative (acid) while filling sample containers	H&S	Heard of	Serious	9	4a Keep sample bottles away from body when filling, wear nitrile gloves while filling sample bottles.
	4b Cut from broken glass container	H&S	Heard of	Significant	12	4b Keep sample bottles in secure storage container with padding (bubble wrap, etc.), inspect bottles for cracks or breaks before using, discard of broken bottles in appropriate container immediately upon identification.

ONE JHA PER TASK. CONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.

- Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
- List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list.
- Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head").
- Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

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JHA Job Hazard Analysis

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Project Manager:	Martin Crook	Location:	Macon, Georgia
Partner-in-Charge:	Bill Butler	Date and Revision Number:	3/1/19 Rev 0

SPECIFIC TASK:	Groundwater Level Gauging
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Minimum Required PPE for Entire Task:	<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety-Toe Shoes <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield <input type="checkbox"/> Respirator <input type="text" value="<enter type and cartridge type>"/> <input type="checkbox"/> Other (specify): <input checked="" type="checkbox"/> Safety Glasses <input checked="" type="checkbox"/> Reflective Vest <input checked="" type="checkbox"/> Gloves <input type="text" value="Chemical Resistant (Nitrile)"/> <input checked="" type="checkbox"/> PPE clothing <input type="text" value="Long Pants"/> <input type="text" value="<enter additional PPE here>"/>
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Additional Task-Step Specific PPE: (as indicated below under Controls)		Equipment / Tools Required:	Water level meter, decon equip.
Training Required for this Task:		Permits Required for this Task:	None
Forms Associated with This Task:	Groundwater Level Log		

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. <u>Signature/Date:</u>
Brad Griffeth / Staff Geologist			
Martin Crook / Project Manager			

Task Steps ¹	Potential Hazards & Consequences ²	select	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks ³
1 Gauging	1a Skin / eye contact with contaminated water	H&S	Heard of	Serious	9	1a Lower and raise downwell equipment slowly to avoid splashes. Wipe excess liquids from equipment as it is being raised. Wear chemical resistant gloves (selected for the specific chemicals of concern) and wear safety glasses. Have portable eyewash available on site. Ensure SDS is available (in HASP) for all chemicals of concern.
	1b Adverse weather conditions or other reason for evacuation causing hazard to H&S	H&S	Possible	Significant	16	1b Understand emergency response, alarm sounds, and evacuation requirements for the plant. Track weather with mobile phone, do not begin work in areas with severe storm warnings, stop work and return to designated area if weather becomes hazardous.
	1c Inhalation of contaminant vapors	H&S	Heard of	Serious	9	1c See project HASP for potential chemicals and exposures. Position work area upwind. Set-up work zone to restrict non-essential access and minimize off-site impacts.
	1d Struck by / pinch point - wellhead lid	H&S	Heard of	Serious	9	1d Inspect work area prior to start of task to identify pinch points. Remove/protect or adjust body position to ensure no contact during task. Do not position your hand or body so it can be caught in identified pinch points. Wear heavy leather or cut-resistant gloves; have gloves on your person at all times.

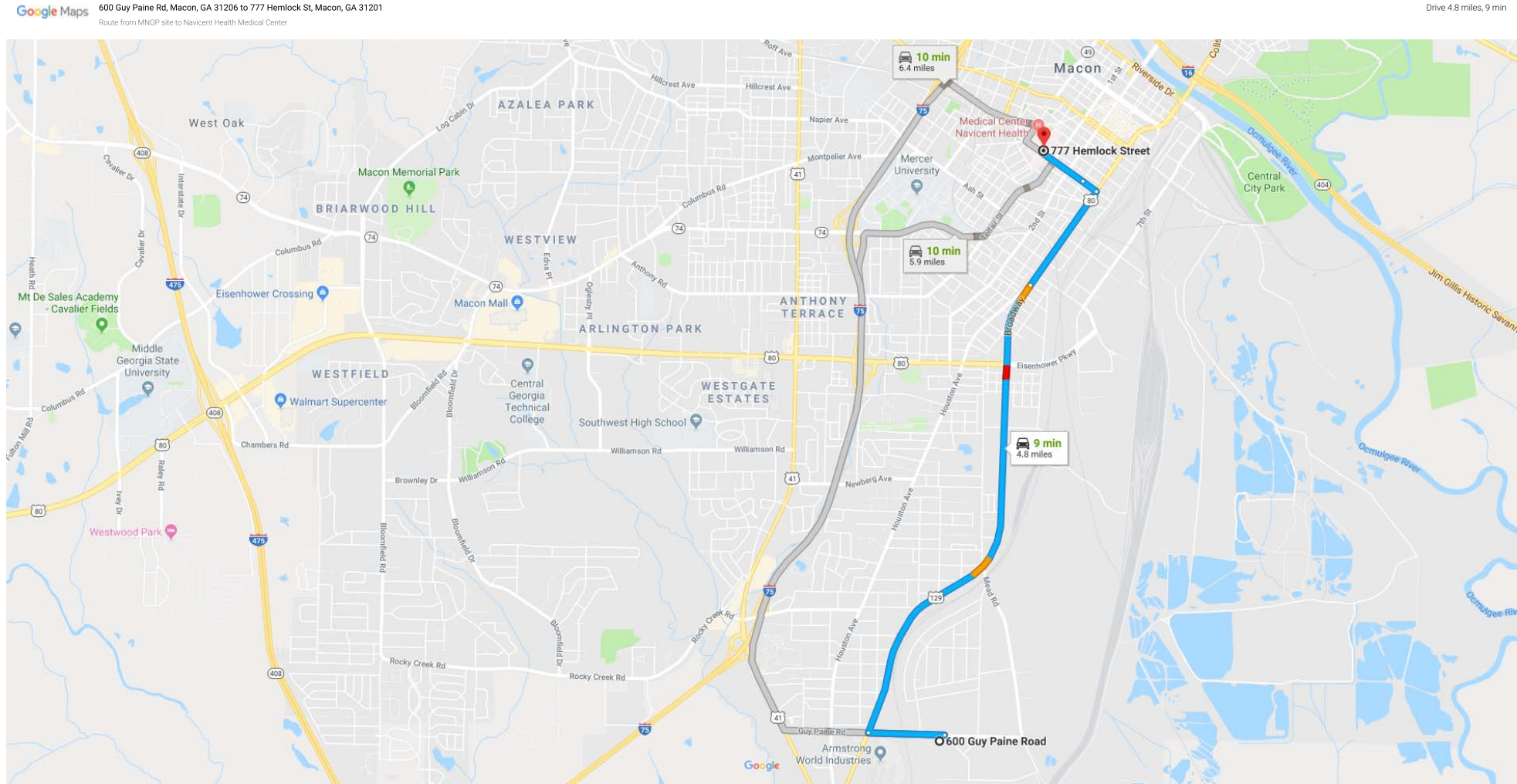
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- Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [RISK = Likelihood x Severity].

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APPENDIX B MAP TO HOSPITAL AND RELEVANT SAFETY FORMS




	Applicability:		Form	Document Number:	Version:
	North America			NAM-1122-FM1	3
	Title:	Pre-Mobilization Activities		Last Revision Date:	1/14/17


		Date Completed	Completed By	Applicable Regulatory References
General				
1	Estimate the expected quantities of each different waste type that may be generated during the job.			
2	Evaluate the potential for recycling/reuse of any wastes generated, as well as any requirements for such.			
3	Determine containment/cover/storage requirements for each type of waste.			
4	Verify which wastes will be placed in client-provided containers for management by the client and which waste ERM will need to containerize.			
5	Develop plan for segregating wastes as needed to facilitate proper handling and ultimate disposal or recycling.			
6	Instruct members of the project team that will be responsible for waste management activities on the requirements for proper waste handling and disposal as established in the project-specific waste management plan.			
Transport				
1	Verify if the waste material is hazardous or nonhazardous. If you are unsure how to make this determination, consult an ERM waste characterization expert.			
2	Verify that all analytical data needed to properly characterize each waste type has been collected.			
3	Verify waste shipment origin, destination, and transit route are within the country of origin only.			
4	Verify proposed disposal facility is on client-approved waste site list (if applicable) and qualified for type of waste.			
5	Verify transporter is licensed to haul the waste and that they have the correct State and Federal numbers.			
6	Verify who will sign the waste profiles and manifest prior to submittal to disposal facility.			
7	If client is not signing profiles or manifest, verify that a "Letter of Authorization" from the client has been completed and signed, identifying ERM as the authorized entity for the manifesting.			
8	If ERM is authorized to sign manifests for the project, and any of the waste are classified as hazardous, identify specific personnel with proper DOT (or other) training.			

	Applicability:		Form	Document Number:	Version:
	North America			NAM-1122-FM2	3
	Title:	Project Execution Activities		Last Revision Date:	1/14/17

		Date Completed	Completed By	Applicable Regulatory References
Profile: To be completed when a new waste profile is prepared.				
1	Verify waste profile exists and proposed disposal facility has accepted profile. If not, prepare profile as indicated.			
2	Obtain waste profile form from selected waste disposal facility.			
3	Determine/obtain waste code(s).			
4	If requested by disposal facility, assemble analytical and/or TCLP data characterizing the constituent makeup of the waste (to be submitted with final profile).			
5	Verify waste profile will be signed by a DOT HM 126-trained and client-authorized employee or representative.			
6	If client is not signing profile, verify "Authorized Agent on behalf of" is written on the signature line on the profile.			
7	ERM Project Manager has reviewed the profile.			
8	ERM Partner-In-Charge has reviewed the profile.			
9	Submit profile to disposal facility for review and approval.			
Transport: To be completed in the field at the time of transport for disposal or recycling.				
1	Verify waste manifest is prepared correctly:			
	<ul style="list-style-type: none"> Use Federal Uniform Hazardous Waste Manifest for hazardous waste and the disposal facilities' approved manifest for nonhazardous waste. 			
	<ul style="list-style-type: none"> Verify manifest will be signed by a DOT HM 126 trained and client-authorized employee representative. 			
	<ul style="list-style-type: none"> Verify "Authorized Agent on behalf of" is written on the signature line of the manifest. 			
2	Verify that appropriate labels have been placed on the waste containers prior to transport.			
3	Verify correct quantity for disposal is written on manifest.			
4	Verify transporter signed and dated manifest.			
5	Verify that an authorized signature and current dates are on the manifest.			
6	Verify you have the generator's copy of the manifest with the transporter's signature.			

	Applicability:	Form	Document Number:	Version:
	North America		NAM-1212-FM2	3
	Title:	Emergency Drill Evaluation Form	Last Revision Date:	6/29/17


Project/Office Name/ Location:		
Project Number (where applicable):	Date:	Time:
Drill Leader/Facilitator:		
1. Describe the drill scenario below.		
2. Post Drill Review		
Evaluation Date:		
List the positive attributes of the drill:		
List the opportunities for improvement.		
List the corrective actions taken and their completion dates. Be sure to include this information in ERM's Corrective and Preventative Action (CAPA) System.		
Corrective Action	Assigned To	Completion Date

	Applicability:	Form	Document Number:	Version:
	North America		NAM-1302-FM3	2
	Title:	Monitoring Equipment	Last Revision Date:	6/7/18


Monitoring Equipment

All monitoring equipment on site must be calibrated per manufacturer specifications (including daily bump tests) and results recorded. Under stable conditions, measurements must be made in the breathing zone at least once every 30 minutes.

Photoionization Detector	Reading	Action Guideline	Comments
Check if required: <input checked="" type="checkbox"/>	Any response below 0.5 ppm, sustained for 1 minute	Level "D" PPE is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	
	0.5 ppm to 5 ppm, sustained for 1 minute	Verify vinyl chloride is not present using a Draeger CMS at each location and each sustained increase of 1 ppm VOCs or greater. If vinyl chloride is below its action level, level "D" PPE is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	
Model: miniRAE with an 11.7 eV bulb, or equivalent	5 ppm to 12 ppm, sustained for 1 minute	Level "C" is acceptable as appropriate.	
Task number(s): 3 and 5	Greater than 12 ppm above background, sustained for 1 minute	Verify methylene chloride is not present using a Draeger CMS at each location and each sustained increase of 1 ppm VOCs or greater. If methylene chloride is below its action level, level "C" is acceptable as appropriate. If methylene chloride is above its action level, stop work. Tasks requiring Level B or Level A PPE are not anticipated during this project. If Level B or Level A PPE is needed, as determined by the FSO and/or the PM, the Business Unit H&S Director will be notified and the HASP will be revised.	

	Applicability:		Form	Document Number:	Version:
	North America			NAM-1302-FM3	2
	Title:	Monitoring Equipment		Last Revision Date:	6/7/18

Colorimetric Detector Tubes	Reading	Action Guideline	Comments
Check if required: <input checked="" type="checkbox"/>	Any response below 0.5 ppm vinyl chloride Any response below 20 ppm methylene chloride	Level "D" PPE is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	For PID detections above background at each location, and for each sustained increase of 1 ppm or greater, verify vinyl chloride is not present above the AL
Model: Draeger CMS	0.5 ppm to 10 ppm vinyl chloride	Level "C" is acceptable as appropriate.	For PID response greater than 12 ppm, sustained for 1 minute at each location and for each sustained increase of 1ppm or greater, verify methylene chloride is not present above the AL
Task number(s): 3 and 5	Greater than 10 ppm vinyl chloride or Greater than 20 ppm methylene chloride	Stop work. Tasks requiring Level B or Level A PPE are not anticipated during this project. If Level B or Level A PPE is needed, as determined by the FSO and/or the PM, the Business Unit H&S Director will be notified and the HASP will be revised.	
Other (specify): Task	Reading	Action Guideline	Comments
Check if required: <input checked="" type="checkbox"/>	Any response below 25 mg/m3	Level "D" PPE is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	
Model: Thermo dataRAM, or equivalent	25 to 58 mg/m3	Apply water or dust suppressant. If levels remain above action level, Level "C" is acceptable as appropriate.	
Task number(s): 3	Greater than 58 mg/m3	Apply water or dust suppressant. If levels remain above action level, Stop work. Tasks requiring PPE for excessive dust are not anticipated during this project. If Level B or Level A PPE is needed, as determined by the FSO and/or the PM, the Business Unit H&S Director will be notified and the HASP will be revised.	

	Applicability:	Form	Document Number:	Version:
	North America		NAM-1302-FM3	2
	Title:	Monitoring Equipment	Last Revision Date:	6/7/18

Contaminants of Concern

Where monitoring equipment will be used on-site to indicate airborne levels of a contaminant, provide a list of the contaminants of concern and their known concentrations in soil and groundwater, if available. Provide applicable units of measure in the "Known Concentration" column. Use this information to develop appropriate action levels for PIDs, FIDs, and other survey instruments. Additional assistance in development of action levels can be found here:

- Action Level Development for Particulates in Soil ([NAM-1300-FM1](#))
- Estimating Vapor Exposure from Volatile Compounds in Water ([NAM-1300-FM2](#))
- Estimating Vapor Exposure from Volatile Compounds in Soil ([NAM-1300-FM3](#))
- Known or Suspected Chemicals of Concern ([NAM-1340-FM1](#)) or Known or Suspected Chemicals of Concern – California Specific ([NAM-1340-FM2](#)); includes applicable exposure limits

Contaminant	Known Concentration	Substrate	Comments
trichloroethylene	max 391 mg/L	<input type="checkbox"/> Soil <input checked="" type="checkbox"/> Groundwater	
methylene chloride	max 1.2 mg/L	<input type="checkbox"/> Soil <input checked="" type="checkbox"/> Groundwater	
vinyl chloride	max 0.007 mg/L	<input type="checkbox"/> Soil <input checked="" type="checkbox"/> Groundwater	
lead	1,000 mg/kg	<input checked="" type="checkbox"/> Soil <input type="checkbox"/> Groundwater	
iron	170,000 mg/kg	<input checked="" type="checkbox"/> Soil <input type="checkbox"/> Groundwater	

Known or Suspected Chemicals of Concern

The following form must be filled out for all confirmed or suspected chemicals present on the site to which the ERM team may reasonably be exposed. Information on each chemical must be provided to all team members. Add additional sheets as necessary to address all chemical concerns.

Chemical Name:	Trichloroethylene		CAS Number:	79-01-6	
Target Organs:	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system		Routes of Exposure:	Inhalation, skin absorption, ingestion, skin and/or eye contact	
			Exposure Symptoms:	Irritation eyes, skin; headache, visual disturbance, lassitude, dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury	
OSHA		NIOSH		ACGIH	
PEL:	100 ppm	REL	NA	TLV	10 ppm
STEL:	NA	STEL	NA	STEL	25 ppm
Ceiling:	200 ppm	Ceiling:	NA	Ceiling:	NA
Peak:	300 ppm (5 min/2 hrs)	Sampling Methods:	NIOSH 1022, 3800; OSHA 1001		
IDLH Level:	1000 ppm	Ionization Potential:	9.45 eV		
		Known/Pot. Carcinogen	Yes		
Chemical Name:	Methylene chloride		CAS Number:	75-09-2	
Target Organs:	Eyes, skin, cardiovascular system, central nervous system		Routes of Exposure:	Inhalation, skin absorption, ingestion, skin and/or eye contact	
			Exposure Symptoms:	Irritation eyes, skin; lassitude, drowsiness, dizziness; numb, tingle limbs; nausea	
OSHA		NIOSH		ACGIH	
PEL:	25 ppm	REL	NA	TLV	50 ppm
STEL:	125 ppm	STEL	NA	STEL	NA
Ceiling:	NA	Ceiling:	NA	Ceiling:	NA
Peak:	NA	Sampling Methods:	NIOSH 1005, 3800; OSHA 59, 80		
IDLH Level:	2300 ppm	Ionization Potential:	11.32 eV		
		Known/Pot. Carcinogen	Yes		
Chemical Name:	Vinyl chloride		CAS Number:	75-01-4	
Target Organs:	Liver, central nervous system, blood, respiratory system, lymphatic system		Routes of Exposure:	Inhalation, skin and/or eye contact (liquid)	
			Exposure Symptoms:	Lassitude; abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite	
OSHA		NIOSH		ACGIH	
PEL:	1 ppm	REL	NA	TLV	1 ppm
STEL:	NA	STEL	NA	STEL	NA
Ceiling:	5 ppm (15 min)	Ceiling:	NA	Ceiling:	NA
Peak:	NA	Sampling Methods:	NIOSH 1007; OSHA 4, 75		
IDLH Level:	ND	Ionization Potential:	9.99 eV		
		Known/Pot. Carcinogen	Yes		
Chemical Name:	Lead		CAS Number:	7439-92-1	
Target Organs:	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue		Routes of Exposure:	Inhalation, ingestion, skin and/or eye contact	
			Exposure Symptoms:	Lassitude, insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	
OSHA		NIOSH		ACGIH	
PEL:	0.05 mg/m3	REL	0.050 mg/m3	TLV	0.05 mg/m3
STEL:	NA	STEL	NA	STEL	NA
Ceiling:	NA	Ceiling:	NA	Ceiling:	NA
Peak:	NA	Sampling Methods:	NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206		
IDLH Level:	100 mg/m3	Ionization Potential:	NA		
		Known/Pot. Carcinogen	No		
Chemical Name:	Iron		CAS Number:	1309-37-1	
Target Organs:	Respiratory system		Routes of Exposure:	Inhalation	
			Exposure Symptoms:	Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis)	
OSHA		NIOSH		ACGIH	
PEL:	10 mg/m3	REL	5 mg/m3	TLV	5 mg/m3
STEL:	NA	STEL	NA	STEL	NA
Ceiling:	NA	Ceiling:	NA	Ceiling:	NA
Peak:	NA	Sampling Methods:	NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G		
IDLH Level:	2500 mg/m3	Ionization Potential:	NA		
		Known/Pot. Carcinogen	No		

Journey Management Plan

Purpose of Journey:		Is this trip necessary?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Client Name:		GMS number:	
Project Name:		Journey Date:	
Originating From: Address/Location		Destination: Address/Location	
Driver and Vehicle Details			
Journey Leader		Contact Number:	
Passenger Details			
Name	Contact Number	Name	Contact Number

Route to be Taken (Detail Journey legs / stages, destinations, route to be taken and speed limits)				
Date	Start Location and Estimated Time	Finish Location and Estimated Time	Anticipated Check-in Call Time	Journey Point of Contact

Identified Risks and Mitigation Plan	
Identified Risks	Mitigation Techniques
Anticipated call in not received	


Pre-Departure Checklist	Yes	No
Has the PIC (or the Journey Leader's supervisor if the Journey Leader is the PIC or there is no PIC associated with the travel) approved the journey?	<input type="checkbox"/>	<input type="checkbox"/>
Pre-trip briefing conducted with Journey Leader and Journey Point of Contact including call in requirements and response if call is not received	<input type="checkbox"/>	<input type="checkbox"/>
Driver has a current driver's license for the class of vehicle and has completed relevant driving safety training	<input type="checkbox"/>	<input type="checkbox"/>
Immediately Before Journey Commences	Yes	No
Driver is physically and mentally fit to perform task (Sufficient rest based on past work hours, time of the day etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle selected is suitable for the trip and cargo/loads are separated from vehicle occupants	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle inspected by driver	<input type="checkbox"/>	<input type="checkbox"/>
Correct Safety Equipment in vehicle for task - Emergency Triangles, Water, First Aid kit, Fire Extinguisher (recommended)	<input type="checkbox"/>	<input type="checkbox"/>
Suitable (checked and operational) communication devices (i.e. mobile telephone, satellite phone, 2 way radio)	<input type="checkbox"/>	<input type="checkbox"/>
Operational In-Vehicle Monitoring System (IVMS), if required	<input type="checkbox"/>	<input type="checkbox"/>
Weather and Road conditions checked	<input type="checkbox"/>	<input type="checkbox"/>

Journey Approved by PIC / Line Manager	Pre-Trip Briefing Completed with Journey Point of Contact
Name: _____	Name: _____
Signature: _____ Date: _____	Signature: _____ Date: _____




Journey Management Plan

Include a Map and/or Directions for the Proposed Journey:

	Applicability:	Form	Document Number:	Version:
	North America		NAM-1501-FM1	4
	Title:	Site Safety Meeting Form	Last Revision Date:	4/9/18


Project Name/ Location:				Phone:	
Project Number:		Date:		Time:	
Meeting Leader:					
Today's Work Tasks(s)			Conducted By:		
<ol style="list-style-type: none"> Review relevant sections of the Health and Safety Plan (HASP), Job Hazard Analyses (JHAs) for planned tasks, and any other applicable procedures. Discuss potential hazards of planned work and control measures to be used to eliminate or reduce risks (including PPE). Pay specific attention to overlapping/ simultaneous operations. Review emergency response procedures including emergency phone numbers, location of emergency equipment (fire extinguishers, first aid kit, AED, eyewashes, safety showers, etc.), exit routes, muster points, methods of conducting head count at muster point, and identity of first responders trained in first aid/CPR. Does everyone fully understand the task(s)? Are there any changes that need to be assessed? Use SNAP cards to assess risks associated with changed or unplanned tasks. Remind the team that everyone on the job site is empowered to stop work if something is unsafe or if there are any questions or concerns regarding safety. 					
What tools and equipment are required for today's tasks? Have they been inspected and are they in good condition?					
What training/qualifications/experience is necessary for today's assigned tasks?					
List any new or Short Service personnel on site today:					
Discuss any recent incidents, near misses, field inspection findings, or other safety observations (or observations from similar tasks performed at other sites):					

	Applicability:		Form	Document Number:	Version:
	North America			NAM-1501-FM1	4
	Title:	Site Safety Meeting Form		Last Revision Date:	4/9/18


Additional Safety Meeting Topics (check those discussed)			
<input type="checkbox"/>	What client safety rules or procedures are applicable to today's activities?		
<input type="checkbox"/>	How will you communicate with others on site? How will you communicate with the PIC and PM?		
<input type="checkbox"/>	What are the potential impacts of planned activities to visitors, nearby workers, or the public?		
<input type="checkbox"/>	Who do you contact if you have questions or before deviating from written procedures?		
<input type="checkbox"/>	What happens and who do you contact if there is an injury or other emergency? If working at an active facility, how will you be alerted of an emergency and what will you do?		
<input type="checkbox"/>	Where is nearest medical facility and how would we get an injured employee there? If medical help is more than five minutes away, is at least one person on site trained in first aid/CPR? How do you contact them?		
<input type="checkbox"/>	Do you have any medical condition or allergy that the project team needs to be aware of? Write this down and keep it in your pocket for reference in the event of an emergency.		
<input type="checkbox"/>	Are any work permits required?		
<input type="checkbox"/>	Has anything unexpected or out-of-the-ordinary occurred on this job recently to share?		
<input type="checkbox"/>	Is there anything different about today's operations as compared to yesterday or previous days?		
<input type="checkbox"/>	What is the worst that could happen if something goes wrong today?		
<input type="checkbox"/>	What activities occurring today could result in hand injuries? Is everyone aware that the use of fixed open-blade knives is not permitted?		
<input type="checkbox"/>	What natural hazards are present (including plants, animals, and insects)?		
<input type="checkbox"/>	What areas of the site have slip/trip/fall hazards? Can these be avoided? Are everyone's work boots in good shape?		
<input type="checkbox"/>	Is everyone fit for duty today (i.e., in a physical, mental, and emotional state to perform your work assignment in a manner which does NOT threaten the safety or health of yourself, your co-workers, property, or the public at large)?		
<input type="checkbox"/>	Other items:		
Meeting Attendees (including employees, contractors, and visitors)			
Name	Company	Sign-In*	Sign-Out**

* Signature/initials in this space verify that the employee is fit for performing work.

** Signature/initials in this space verify that the employee was uninjured during the workday.

	Applicability:		Form	Document Number:	Version:
	North America			NAM-1501-FM2	3
	Title:	Undeveloped, Remote, or Inactive Sites		Last Revision Date:	3/8/17

No.	Issue	Considered?	Additional Actions Necessary Before Beginning Work?
Personnel Management			
1	Has an effort been made to secure at least a two-person team for this field work?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
2	If only one person is making the site visit, has that decision been reviewed and approved by the Partner-in-Charge (PIC), in consultation with the H&S Team?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
3	Has someone been designated as the team leader to supervise the site activities?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
4	Does the team have instructions on where to park safely?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
5	Has the most appropriate location for site entry been determined?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
6	Has the client/site been notified that an ERM representative will be on site so that entry and security issues are addressed?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
7	Has a site map been provided, if available?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
8	Has ERM been informed of any hazards unique to this site?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
9	If driving more than 500 km (310 miles) in a single day, driving in excess of 4.5 hours in a single day, or driving in a remote location, a Journey Management Plan is required and should be appended to the HASP. Consult ERM H&S Standard ERM-1410-ST1 (<i>Travel Risk Assessment</i>) for requirements.	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
Field Communications			
1	Do team members have a reliable means of communicating with other ERM team members in event of an emergency (e.g., mobile phone, two-way radio, satellite phone or beacon, etc.)?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
2	Is there a plan in place to ensure that the Project Manager or PIC communicates with the field team members during the day and when all team members have safely left the site at the end of the day and arrived back at their evening destination?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
3	Has a plan been developed on how to address or deal with unauthorized people encountered on or near the site?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	

	Applicability:		Form	Document Number:	Version:
	North America			NAM-1501-FM2	3
	Title:	Undeveloped, Remote, or Inactive Sites		Last Revision Date:	3/8/17

No.	Issue	Considered?	Additional Actions Necessary Before Beginning Work?
Field Safety			
1	Have PPE requirements been evaluated and the following minimum issues been considered?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
	• Sturdy work boots (steel-toed/steel shank if crushing or puncture hazards are present)	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
	• Long pants/long-sleeved shirt (protection against poisonous plants, insects, and sunburn)	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
	• Safety glasses (if potential for flying particulates is present)	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
	• Gloves (leather or Kevlar for exposure to cut, pinch, or abrasion hazards; chemical resistant gloves as needed)	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
	• Hi-visibility vest (potential exposure to vehicle traffic)	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
	• Hard hat (falling objects, struck against, or contact between head and electrical shock hazard is present)	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
2	Is there a process in place to monitor weather forecasts?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
3	Is there a sheltering plan in the event of inclement weather?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
4	Is there access to potable water on the site or have plans been made to bring water with the team members?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
5	Is an ERM-approved first aid kit immediately available?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
6	Is there at least one first aid trained person on site?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
7	Is the team aware of any local plants, insects, arachnids, or animals that could carry disease or cause harm?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
8	If so, have appropriate repellents, clothing, or other protective measures been considered and acquired?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
9	If a team member is allergic to any natural agents, do they have the appropriate medications with them?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
10	If a team member is allergic to any natural agents, are other team members aware of the allergy and knowledgeable about the location and application of appropriate medications?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	
11	Has the team addressed the need for periodic clothing and body inspection to note the presence of disease-bearing insects/arachnids?	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA	



Subsurface Clearance Project Plan

Site/Project Name: _____

Client: _____

ERM Project No.: _____

This Subsurface Clearance (SSC) Project Plan must be completed for each phase of ground disturbance activities at a project location. A copy of this document must be maintained at the project location for the duration of ground disturbance activities. The ERM Partner-in-Charge (PIC) and SSC Experienced Person (EP) or field team lead must review and approve the completed SSC Project Plan **prior to any point disturbance clearance or ground disturbance activities** (all approvals appear on final page of this document).

Administrative Information	Date Plan Started:	Field Work Start Date:
	Date Plan Completed:	Field Work End Date:
	Project Manager:	Partner In Charge:
	SSC EP ¹ / Field Team Lead:	Local MP or designee (for any waivers):
	List any additional SSC General Employees (GEs) working on this project:	
	Describe the Scope of Ground Disturbance Activities:	Check all that apply: <input type="checkbox"/> Point disturbances (manual / hand digging only) <input type="checkbox"/> Point disturbances (using mechanized equipment) <input type="checkbox"/> Excavation / trenching / grading <input type="checkbox"/> Removal / coring / drilling of concrete, asphalt, etc. <input type="checkbox"/> Other - Describe:

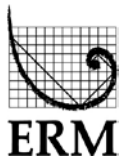
Project Information Summary	Yes	No	N/A	Comments
Knowledgeable Contact Person(s) identified, and presence requested during site walk. SSC Project Plan reviewed with knowledgeable contact person(s)				Who:
As-built drawings, site plans, maps, aerial photographs, and other information sources available and reviewed				List (including dates):
Other information obtained (e.g., easements, right-of-ways, historical plot plans, current/historical aerial photographs, fire insurance plans, tank (dip) charts, SSC information obtained as part of previous site investigations, soil surveys, boring logs				List (including dates):
All contractors (including ground disturbance, private utility locating, concrete coring, etc.) prequalified and approved				List Private Utility Locate Contractor(s):
Specific SSC scope of work items in all work orders for contractors involved in SSC and ground disturbance activities (i.e. point disturbance clearance methods and required tools, field documentation and utility markout methods for private utility locate contractors, etc.)				List all Ground Disturbance Contractors:
Additional client and/or regulatory requirements apply to the project and have been incorporated into H&S plan documents				If yes, specify:
ERM / client / regulatory SSC requirements have been communicated to all field personnel including contractors (refer to SSC Review Checklist for Contractors - <i>ERM-1511-FM5</i>)				
Current and valid SSC training certifications confirmed for all ERM staff (including PIC and PM)				
Current and valid additional training certifications (e.g., detection equipment operation) confirmed for all ERM staff and contractor personnel				List additional trainings:
UXO/MEC risks assessed: UXO/MEC is present or potentially present				If Yes, stop work and contact PIC
Project location meets criteria for Remote/Greenfield Site				If Yes, project teams can elect to complete the SSC Project Plan for Remote/Greenfield Sites (ERM-1511-FM2) instead of this form

¹ SSC EP not required for Remote / Greenfield sites, as defined in the ERM Global SSC Procedure (ERM-1511-PR1).



Utility Markouts	Yes	No	N/A	Comments
Public Utility Locates completed (where available)?				
Responses received from ALL companies notified?				
List utilities notified:				
	Yes	No	N/A	Comments
Private Utility Locates completed ² (waiver required if "NO")				
Utilities clearly marked with agreed method?				
Private locate findings documented?				
Private Utility Locate Performed by:	Date of most recent training on equipment operation:			
Type of equipment / methods used:				
Date of most recent calibration of detection equipment:				
Note any limitations (e.g., sources of interference, geology, etc.):				

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Subsurface Clearance Project Plan

Site Services Model

Attach a site plan or drawing (to scale) showing planned ground disturbance location(s), the locations / routes of all identified or suspected subsurface and above-ground utilities and structures, and associated critical zones and excavation buffers.

Utility / Structure	Present?			Anticipated depth (note units)	Located?		Status (active, inactive, abandoned / decommissioned, etc.)	Comments (For each, describe how located and quality of information available)
	Yes	No	Un- known		Yes	No		
Electricity								
Gas								
Petroleum Pipeline								
Other Pressurized Lines								
Process Sewer								
Sanitary Sewer								
Storm Sewer								
Potable Water								
Telephone / Communication								
Fiber Optic								
Plant air / steam								
Fuel / oil								
Reclaimed / waste water								
Fire suppression								
Underground tank(s)								
Other (Describe):								

Additional Notes on Site Services Model including identification of any data gaps:

Contact Person(s) Approval of Ground Disturbance at All Locations

Name (Print)	Company	Name (Sign)	Date / Time

Final Critical Zone Determination

Are there any ground disturbance locations known or suspected to be inside Critical Zones?

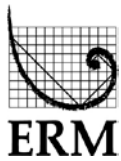
☐

YES

PIC and Local MP (or designee) must BOTH grant waiver for work within the Critical Zone. A sketch map must be developed for EACH ground disturbance location inside a Critical Zone (refer to template on last page)

☐

NO

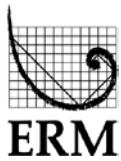


Subsurface Clearance Project Plan

Overhead Clearance	Yes	No	N/A	Comments
Overhead utility lines in the general vicinity of ERM work onsite?				If NO, check N/A for remaining items in this section
If overhead utilities are present, has nominal voltage been determined? If yes, list in comments section.				Voltage:
Overhead clearances confirmed with equipment operators for safely deploying equipment to the location?				Clearance distance(s):
Proximity alarms, spotters, and /or warning signage necessary to ensure safe clearances?				
If the equipment is closer than the minimum clearance distance to the overhead utility, can utility be de-energized?				
If utility cannot be de-energized, alternate plan developed with approval from the PIC and client/site owner?				

Plan for point disturbance clearance at location(s):	Attach additional sheets to completely describe clearance method, tools and depth if these will vary during the process from location to location.			
(Note that this plan must be reviewed and approved by the PIC before any clearance activities commence)	Yes	No	N/A	Comments
Clearance technique to be used (indicate which method): <input type="checkbox"/> Compressed air excavation (ERM preferred method) <input type="checkbox"/> Pressurized water excavation <input type="checkbox"/> Hand digging <input type="checkbox"/> Hand augering <input type="checkbox"/> Soil probe rod <i>Pick axes, pointed spades, or any other tool that comes to a point are NOT to be used for point disturbance clearance.</i> <i>Note: a waiver is required if no clearance will be performed prior to use of mechanized equipment</i>				Provide rationale if NOT using preferred method of compressed air excavation: <input type="checkbox"/> Scope of work limited to hand digging only <input type="checkbox"/> Equipment not available <input type="checkbox"/> Cannot meet technical objectives (e.g., vapor pins) <input type="checkbox"/> Other (describe):
For locations that will be advanced with mechanized equipment (e.g., drill rig or direct-push) after initial clearance: Diameter of clearance must be to <u>LARGER OF</u> : 4 inches (10 cm), or at least 125% of the diameter of largest downhole tool to be used				Specify diameter (include units) of largest downhole tool: Specify diameter (include units) to be cleared:
For locations that will be advanced with mechanized equipment (e.g., drill rig or direct-push) after initial clearance: Depth of clearance: <input type="checkbox"/> Outside Critical Zones, to 5 feet (1.5 meters). <input type="checkbox"/> Inside Critical Zones, to 8 feet (2.4 meters) at a minimum, and deeper if necessary to clear to depths greater than 8 feet for deeper utilities and structures <input type="checkbox"/> For locations with frozen soils, to 2 feet (0.6 meters) beyond the bottom of the frost line at the site.				Specify depth(s) and units:
Concrete coring / cutting – personnel performing these activities have been verified as trained and competent?				Describe risk mitigation techniques to be employed:

Excavation Plan	Yes	No	N/A	Comments
(Note that this plan must be reviewed and approved by the PIC before any disturbance activities commence)				
Communicate excavation plan and 2-foot (0.6-meter) Excavation Buffer location(s) to contractor(s). Delineate all Excavation Buffers.				
If possible, work with contact person / site owner to de-energize subsurface services prior to beginning excavation				
Risk mitigation measures reviewed and acceptable?				Describe:



Subsurface Clearance Project Plan

Approvals

Review Meeting

The SSC Project Plan must be reviewed with the PIC BEFORE any point disturbance clearance or ground disturbance activities occur. This review must be completed through a verbal conversation, whether in person or by phone or video conference. Documentation of review can be indicated as "verbal" or be received via e-mail initially, but must be followed up with signatures in the final SSC Project Plan.

Reviewed by	Signature	Date of Review	Comments
SSC EP or Field Team Lead (required review):			
PIC (required review):			
Project Manager (optional review):			

Waiver Approvals

SSC Component Being Waived:	Waived By (PIC)	Waived by (Local MP)	Date	Rationale
Requirement for SSC EP to oversee execution of the SSC Process (can include the entire project or specific SSC-related tasks)				Specify scope of waiver:
Performance of private utility markouts				
Clearance of point disturbance locations prior to advancing with mechanized equipment (including no clearance or partial clearance)				Indicate specific locations and scope of waiver:
Prohibition of ground disturbance inside a Critical Zone				Indicate specific locations:

SSC Project Plan Close-out (SSC EP or Field Team Lead)

Name (Print)	Name (Sign)	Date / Time

Additional Notes or Learnings

--



Site/Project Name: _____

Client: _____

ERM Project No.: _____

SSC EP / Field Team Lead: _____

GROUND DISTURBANCE LOCATION ID:

GROUND DISTURBANCE LOCATION	
DESCRIPTION:	

1. Create a sketch of the disturbance (in the space to left or attach) that is drawn to scale and contains the following information:
 - a. The disturbance location
 - b. Surface landmarks and overhead obstructions (buildings, roads, overhead lines, etc.)
 - c. Subsurface utilities and structures that are:
 - i. Identified in the Site Service Model
 - ii. Marked by public and private utility locators
 - iii. Communicated by knowledgeable contact person(s)
 - d. Any surface visual clues as to potential underground services (junction boxes, drains, disturbed concrete, signage, etc.)
2. Use your sketch to mark Critical Zones (3m / 10 feet) around underground utilities and structures.
3. For excavations, use your sketch to mark Excavation Buffers (0.6m or 2 feet) from subsurface utilities and structures.

Project Audit

ERM-1941-FM3

Remember: this form must be completed and submitted online in order to be counted in your Active Leadership Audit Dashboard

Auditor Information:	<input type="text"/>	Audit Location:	<input type="text"/>
Enter GMS Number:	<input type="text"/>	Audit Date:	<input type="text"/>

1.0	Safety Planning (recall: 'Safety' means the protection of our people, our stakeholders, and the environment in which we work)	Yes / No / NA
1.1	<p>Were the appropriate Safety Planning documents completed for this project? <i>Based on the type of project, some or all of these may be appropriate: HASP template, Job Hazard Analyses (JHAs) for all tasks, Subsurface Clearance (SSC) forms, identification and action levels for chemicals of concern, waste handling and storage, etc.).</i></p> <p>Comments</p> <input type="text"/>	Yes / No / NA
1.2	<p>Consider the potential risks associated with this project. Were they all identified and discussed within the Safety Planning documentation? <i>Think about safety / injury risks, security risks, travel risks, environmental risks, client expectations, legal requirements, etc.</i></p> <p>Comments</p> <input type="text"/>	Yes / No / NA
1.3	<p>Are the Safety Planning documents complete, up to date, approved, and accessible to / known by all members in the project team?</p> <p>Comments</p> <input type="text"/>	Yes / No / NA
1.4	<p>Choose a random Job Hazard Analysis (JHA) from the Safety Planning documents: was the JHA completed by and/or reviewed with the employees undertaking the work?</p> <p>Comments</p> <input type="text"/>	Yes / No / NA
1.5	<p>Choose a random Job Hazard Analysis (JHA) from the Safety Planning documents: does the wording in the JHA specifically identify the potential mechanism for injury? Do the controls specifically address the identified hazards? For example: <i>"There is a risk of falling off the embankment behind the car park and breaking a leg" = Correct; "Fall from heights" = Not enough detail</i></p> <p>Comments</p> <input type="text"/>	Yes / No / NA
1.6	<p>Were all legal requirements considered? <i>Consider applicable permits, tax requirements, regulatory obligations? Is waste handled, transported and disposed of by licensed and approved contractors (check a sample of associated records to confirm they are completed correctly)? If working outside of an established country, are the applicable legal requirements documented?</i></p> <p>Comments</p> <input type="text"/>	Yes / No / NA

1.7	<p>Were contractors pre-qualified and managed according to expectations? <i>Consider contractor pre-qualification processes, submission and review of contractor safety documents, contractor oversight, etc.</i></p> <p>Comments</p>	Yes / No / NA
2.0	Specific Risk Mitigation & Protection	Yes / No / NA
2.1	<p>Was adequate PPE identified and available for all tasks performed (or to be performed)?</p> <p>Comments</p>	Yes / No / NA
2.2	<p>Were environmental risk mitigation techniques identified and utilized? <i>Consider chemical/waste storage (labelling, handling, bunding), disposal practices, protection of native species, silt fencing / runoff protection, etc.)</i></p> <p>Comments</p>	Yes / No / NA
2.3	<p>Was required barricading and equipment guarding in place and documented in safety planning documentation to ensure employees are protected from harm? <i>Consider both onsite equipment and tools, as well as forces outside of ERM's control (e.g. vehicles, plant operations).</i></p> <p>Comments</p>	Yes / No / NA
2.4	<p>Was field or office ergonomics identified as a risk and adequately controlled for in the planning documentation? (Put NO if there was a failure to identify or risks were not controlled; Put NA if no field or office ergonomics issues are identified) <i>Consider areas of this project where repetitive movement or prolonged duration of work could have resulted in an overuse or ergonomic injury?</i></p> <p>Comments</p>	Yes / No / NA
2.5	<p>Consider fatigue management on this project. Was fatigue management addressed by the project team and documented in the Safety Planning documents? <i>Consider teams that are working long hours on consecutive days; traveling and working long days; performing in atypical conditions (heat, cold, altitude).</i></p> <p>Comments</p>	Yes / No / NA
2.6	<p>Consider fitness for work on this project. Was fitness for duty addressed by the project team and documented in the safety planning documents? <i>Answer No if fitness for duty was not considered or not documented in safety planning documents; answer N/A if fitness to work was considered and determined to not apply to the project activity.</i></p> <p>Comments</p>	Yes / No / NA
2.7		Yes / No / NA

	<p>Were appropriate emergency planning and response actions considered (and documented) prior to project initiation?</p> <p><i>Emergency contact lists, injury response equipment (first aid kits), chemical / waste spill prevention and response, etc.?</i></p> <p>Comments</p>	
3.0	ERM Five for Life (High Risk Activities)	Yes / No / NA
3.1	<p>Driver and Vehicle Safety:</p> <p><i>Were Journey Management Plans (JMPs) prepared when required? Were the work vehicles used in compliance with the Driver and Vehicle Safety procedure (equipment storage, vehicle maintenance, etc.)?</i></p> <p>Comments</p>	Yes / No / NA
3.2	<p>Subsurface Clearance (SSC):</p> <p><i>Was an 'Experienced Person' available onsite during all SSC activities? Have all documents associated with SSC activities been prepared (waivers, addendums, etc.)?</i></p> <p>Comments</p>	Yes / No / NA
3.3	<p>Short Service Employees (SSE):</p> <p><i>Were all Short Service Employees, when sent out into the field, identified to the field team leader and assigned an appropriate mentor?</i></p> <p>Comments</p>	Yes / No / NA
3.4	<p>Marine and Offshore Activities</p> <p><i>Were all marine activities described in the safety planning documents? Did all employees working on an offshore platform have the required training and experience? Was the HASP reviewed and approved by a Partner with Offshore experience?</i></p> <p>Comments</p>	Yes / No / NA
3.5	<p>International Travel</p> <p><i>Was an online Travel Risk Assessment (TRA) completed and approved prior to travel? Was the daily communication plan defined in the TRA effective?</i></p> <p>Comments</p>	Yes / No / NA
<p>Include any additional information / comments about this audit below:</p>		

Field Audit

ERM-1941-FM4

Remember: this form must be completed and submitted online in order to be counted in your Active Leadership Audit Dashboard

Auditor Information:

Audit Location:

Enter GMS Number:

Audit Date:

Recall: 'Safety' means the protection of our people, our stakeholders, and the environment in which we work.

1.0	Safety Planning	Yes / No / NA	Comments
1.1	All Safety planning documentation has been reviewed and signed by all personnel on site?	Yes / No / NA	
1.2	All Safety planning documentation is complete and readily available on site right now? <i>Do the planning documents reference applicable client procedures and policies that must be followed?</i>	Yes / No / NA	
1.3	JHA's are available for each activity being performed?	Yes / No / NA	
1.4	All relevant regulatory permits have been obtained and are complete for this work? (List permits in comments) <i>Also consider any client permits or authorizations that are required.</i>	Yes / No / NA	
1.5	Choose a random Job Hazard Analysis (JHA) from the Safety Planning documents: was the JHA completed by and/or reviewed with the employees undertaking the work? <i>Do the employees understand the requirements of the JHA? Ask questions to verify they know the risk mitigation measures.</i>	Yes / No / NA	
2.0	PPE, Equipment and Barricading	Yes / No / NA	Comments
2.1	All personnel have (and are correctly using) the appropriate required equipment? (In addition to being available, ensure that it is in good condition and within its designated lifespan)	Yes / No / NA	
2.2	PPE is identified in each JHA and is relevant and appropriate to the task being performed?	Yes / No / NA	
2.3	All client/industry required PPE policies are known and implemented? (Ask a random employee)	Yes / No / NA	
2.4	All equipment is guarded against entanglement, entrapment or dangerous contact?	Yes / No / NA	
2.5	If equipment has been modified or customized, has an engineering review been performed and documented to verify it is safe to use and continues to meet the relevant legislation? (Ask the equipment operator) <i>Use N/A if there were no equipment modifications identified. Use No if equipment was modified and the operator cannot demonstrate it continues to meet the relevant legislation.</i>	Yes / No / NA	
2.6			

All areas that present a risk of injury to personnel or third parties are appropriately barricaded?		Yes / No / NA	
3.0	Communication and Monitoring	Yes / No / NA	Comments
3.1	A daily site meeting occurred, and covered all activities on site that day, with the relevant personnel involved? (Including any other parties affected?)	Yes / No / NA	
3.2	Contractors are involved in all discussions on site? (Daily efforts are made to communicate project activities and changes with the contractor)	Yes / No / NA	
3.3	All persons temporarily accessing the work site have received a safety briefing informing them of applicable risks? (Did you receive a briefing when you arrived at the site?)	Yes / No / NA	
3.4	All monitoring equipment (such as PID, gas detectors, explosion meters) are present, well-maintained, calibrated, and used as required by HASP?	Yes / No / NA	
3.5	Vehicle inspection checklists have been completed for ERM-owned or long-term leased vehicles onsite?	Yes / No / NA	
4.0	General Work	Yes / No / NA	Comments
4.1	Chemical and/or waste areas have appropriate signage, waste disposal processes are understood and correctly implemented, and emergency response processes are place?	Yes / No / NA	
4.2	Utility mark-outs/notifications have been completed as appropriate for the work and following ERM's Subsurface Clearance Requirements, as applicable? (Consider completing an SSC audit of the site if subsurface work is occurring)	Yes / No / NA	
4.3	Work and equipment is positioned safely at appropriate distances from railroad tracks, traffic areas, and overhead power lines? Overhead obstructions / interference is considered in the safety planning documents?	Yes / No / NA	
4.4	General housekeeping at the site is appropriate? (Materials are stored/stacked safely and orderly; waste is collected and labelled; hygiene facilities are available and clean, etc.?)	Yes / No / NA	
4.5	Correct lifting and manual handling techniques are being used by all on site? (In your opinion - Stand back and observe)	Yes / No / NA	
4.6	Emergency response information and equipment defined in the Safety documentation is available and accessible? (Emergency phone numbers, spill response kits, first aid kit, fire extinguishers, safety shower/eye wash, etc.)	Yes / No / NA	
5.0	Safe Behaviors	Yes / No / NA	Comments
Randomly sample at least one employee, and at least one contractor where available			
5.1	Ask: "What does stop work authority mean?" Did all personnel sampled understand stop work authority?	Yes / No / NA	
<i>You have the responsibility to stop work if you believe there is an imminent risk of injury. First you should ask a colleague to make sure you have risk assessed the potential risk correctly. If you are still not satisfied, or believe the risk is imminent you should call for a stop work immediately</i>			
5.2	Ask: "What incidents should I report and how do I report them"?		

Did all personnel sampled understand the incident reporting requirements?

Yes / No / NA

All incidents should be reported to the supervisor on site asap, and then an ECS record should be made within 24 hours. There may be client requirements for reporting as well.

5.3 Ask: "In the activities you are performing today. What could cause you a manual handling or ergonomic injury? How are you ensuring this won't happen?"

Is the prevention of manual handling or overuse injuries adequate?

Yes / No / NA

Look for understanding around how to carry or stand/bend/sit while performing the work. Sharing the work load or ideally using mechanical aids to prevent overuse injury or challenging postures.

6.0 Looking at Risks

Comments

6.1 Stand back and look around the work area. Do the hazards identified below have appropriate control measures in place?

If you see something and you are unsure if it is a hazard, ask a nearby employee what their opinion is. This may reveal an uncontrolled hazard, or you may have just not been aware of the controls in place. Answer Yes if the hazard is present and has an effective control measure. Answer No if the hazard is present and does not have an effective control measure. Answer N/A if the hazard is not present.

Stand back and look around the work area for the specific hazards below. Are all of these hazards being adequately controlled (enter "No" if the hazard is present but not adequately controlled; enter "NA" if the hazard is not present)

Yes / No / NA Comments

6.2 Caught (On, in or under)

Yes / No / NA

6.3 Hit by or against

Yes / No / NA

6.4 Exertion or fatigue

Yes / No / NA

6.5 Energy release (Heat, electricity)

Yes / No / NA

6.6 Slip trip or fall

Yes / No / NA

6.7 Exposure (Weather, plant or animal)

Yes / No / NA

6.8 Breach of procedure

Yes / No / NA

6.9 Security breach, actual or threatened violence

Yes / No / NA

6.10 Release of hazardous material into the environment

Yes / No / NA

6.11 Loss/damage of property

Yes / No / NA

6.12 Work near overhead utility lines

Yes / No / NA


6.13

Were all of the identified hazards mentioned in the available Safety documentation?

Yes / No / NA

Include any additional information / comments about this audit below:

APPENDIX C APPLICABLE ERM SAFETY STANDARDS/PROCEDURES

	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1122-PR1	4
	Title:	Waste Management Planning	Last Revision Date:	7/31/18

1. Purpose and Scope

This procedure outlines general planning steps that should be followed on projects where ERM's activities (or those of ERM's contractors) are likely to create wastes or where ERM has taken some contractual responsibility for handling waste for the client. ERM generally does not generate significant hazardous or non-hazardous waste as part of its operations, since ERM's role is typically limited to supporting waste management activities of the client (owner or responsible party). In those situations, ERM does not direct or control waste management activities, but will use the waste management plan developed by the client.

This procedure is not intended to address all possible waste management situations. Project-specific adjustments may need to be made as appropriate depending on specific circumstances.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure.

Project Manager: Responsible for the following elements:

- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC, any observed deficiencies in the implementation of this procedure.


3. Definitions

None.

4. Procedure

For projects described in Section 1, a waste management plan specific to the project activities should be developed. The plan should address the following basic elements:

- Assessment of the nature and type of waste;
- Estimate of the amount of each waste that may be created;

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	North America		NAM-1122-PR1	4
	Title:	Waste Management Planning	Last Revision Date:	7/31/18

- Evaluation of the proper handling, storage, transportation and disposal methods appropriate to manage the various wastes;
- Evaluation of specific personal protective equipment to be worn, including requirement to use appropriate gloves;
- Sampling, analysis, and proper characterization of any wastes and interface with the client to confirm storage, transportation, and disposal requirements; and
- Arrangement for proper manifesting and transportation of the materials.

The waste management plan will be reviewed and approved by the PIC and, where necessary, the client prior to execution.

4.1 Pre-Mobilization

Prior to mobilizing to the field, a project health and safety plan (HASP) must be developed, in accordance with [NAM-1110-PR1](#) (*Project Health and Safety*) to assess the potential hazards associated with the operations that will be undertaken during the project. As part of the review of project hazards, the ERM Project Manager and PIC will evaluate the project scope to assess whether the project will likely involve waste generation by ERM or if ERM will be directly responsible for managing wastes.


If the evaluation indicates that ERM or its contractors will be generating wastes or will be responsible for waste management, the applicable portions of [NAM-1122-FM1](#) (*Pre-Mobilization Activities*) will be factored into the project-specific waste management plan. The form provides guidance on the subtasks that generally should be followed during the pre-mobilization phase of the project to address waste management requirements.

Depending on the complexity of the project and client requirements, [NAM-1122-FM1](#) may be replaced with a more detailed document that addresses each element in [NAM-1122-FM1](#), as needed. The documentation will then be combined with the project execution phase (Section 4.2) to complete the project-specific waste management plan.

4.2 Project Execution


The waste management plan must anticipate activities to be conducted in project execution and set the stage for carrying them out within the framework of the overall plan. A general proposed format for including the necessary components in the plan to address such activities is presented in [NAM-1122-FM2](#) (*Project Execution Activities*).

Following the project execution phase and depending on the nature of the project, it may be appropriate to prepare a waste management report. Such a report would provide a discussion on the types, amounts, and disposition of wastes that were handled during the work. The specific format and content of such a report should be discussed with and approved by the client.

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	Title:	Waste Management Planning	Last Revision Date:	7/31/18

5. References

- ERM Form [NAM-1122-FM1](#) (*Pre-Mobilization Activities*)
- ERM Form [NAM-1122-FM2](#) (*Project Execution Activities*)
- ERM Procedure [NAM-1110-PR1](#) (*Project Health and Safety*)

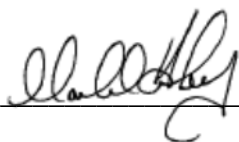
	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1122-PR1	4
	Title:	Waste Management Planning	Last Revision Date:	7/31/18

Document Control Information

Original Effective Date: 6/9/11


Policy Approval by: Mark Hickey

Approval Signature: _____



Revision History

Section	Reason for Revision	Date
All	New document.	6/9/11
All	Reformatted document. Revision of document language in several areas.	6/25/15
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/14/17
4	Added information on PPE selection	7/31/18

	Applicability:	Procedure	Document Number:	Version:
	Global		ERM-1430-PR1	2.2
	Title:	Driver and Vehicle Safety	Last Revision Date:	28 Dec 2016

1. Purpose and Scope

This document establishes the requirements for vehicular travel while on ERM company business (excluding public transportation). This procedure defines the minimum requirements; more stringent local requirements may be applicable.

2. Roles and Responsibilities

Business Unit (BU) Fleet Manager. Implement written procedures to manage the BU fleet in accordance with this procedure.

BU Managing Partner (MP). Establish driver training programs (as applicable); authorize employees that are permitted to operate a motor vehicle on company business; designate a BU Fleet Manager if the BU has leased or owned vehicles.

Employees. Notify their line manager within one day of suspension or revocation of their driver's license, if an Authorized Driver.

Journey Leader. Complete the JMP, pre-departure checks, and required check-in calls. The Journey Leader shall be identified in the JMP, and is typically the primary driver.

Journey Point of Contact. Receive the JMP identified check-in calls, initiate response plan in JMP if check-in call not received.

Partner in Charge (PIC). Ensure client-related driver training requirements have been communicated to the project team and implemented; approve Project-related Journey Management Plans (JMPs).

3. Definitions


Authorized Driver. ERM employee permitted by the BU MP to operate a motor vehicle while on company business.

Company business: All driving associated with ERM work, with the exception of an employee's standard commute from home to the office.

Defensive Driving: A driving technique that aims to reduce the likelihood of a serious accident by anticipating dangerous situations, despite adverse driving conditions or the mistakes of other drivers. In some locations, this is also known as Alert Driving.

Gross Vehicle Weight Rating (GVWR): Maximum operating weight of a vehicle as specified by the manufacturer.

Hired vehicle: Vehicle provided by a vehicle rental company that includes a driver.

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Leased vehicle: A vehicle under a long-term rental agreement between the vehicle rental company and ERM.

Off-road driving: Any driving that does not occur on a permanently maintained road, with the exception of driving that occurs completely within the project site.

Remote driving: Driving in a location where emergency assistance may not be readily available or present (e.g., unpopulated areas on non-major highways), areas with known security concerns, or any other area deemed “remote” by the driver (i.e. driver is uneasy or uninformed about the destination).

Rented vehicle: Vehicle provided by a vehicle rental company that an ERM employee will be driving.

Vehicle used for Field Work: For the purposes of this Procedure, a vehicle is used for field work if the vehicle is driven for intrusive field activities, gauging, sampling, operations and maintenance (O&M), construction, demolition, or any work at remote sites; including motorcycles, motor bikes and all-terrain vehicles (ATVs).

4. Procedure

4.1 Risk Assessment and Planning

All vehicular travel shall be considered as a distinct task in the health and safety planning process, and shall have a Job Hazard Analysis (JHA) completed in accordance with the *Project Health and Safety Planning* Procedure. In addition to the JHA, a documented and approved Journey Management Plan (JMP) is mandatory for the following conditions:


- Single day journey in excess of 500 km (310 miles)
- Single day estimated driving duration in excess of 4.5 hours
- Driving in a remote location (including off-road driving)
- Driving in any location/region identified as “High Risk” by Control Risk Group (CRG) and/or Regional H&S Lead

The JMP shall be completed using *ERM-1430-FM1*, shall designate a Journey Leader and a Journey Point of Contact, and shall be approved by the PIC (or the Journey Leader’s supervisor if the Journey Leader is the PIC or there is no PIC associated with the travel). A copy of the JMP shall be maintained with the traveller and in the Project File.

4.2 Driver Requirements

4.2.1 Minimum Expectations

All Authorized Drivers shall meet the following requirements:

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	Global		ERM-1430-PR1	2.2
	Title:	Driver and Vehicle Safety	Last Revision Date:	28 Dec 2016

- Hold a valid and current driver license for the class of vehicle to be operated. It is the responsibility of the employee to inform his/her supervisor within the next working day of a driver license suspension or revocation.
- Not use a mobile phone while operating a vehicle (per *ERM Global Policy – Mobile/Cellular Telephone and Personal Digital Assistant (PDA) Use While in a Vehicle*).
- Not be under the influence of alcohol or drugs, or any other substance or medication that could impair their ability to drive (per *ERM Global Policy – Drug and Alcohol Use*).
- Inspect vehicle prior to each use and confirm that there are no obstacles in the vehicles travel path or under the vehicle by completing a 360° walk around the entire vehicle.
- Follow all posted signs and speed limits, all applicable laws and regulations, and any client-specific or site specific vehicle safety policies.
- Not drive a vehicle (including a combination vehicle) with a combined gross vehicle weight rating (GVWR) in excess of 10,001 lbs (4,500 kg) without written authorization from the RCEO and appropriate regulatory licensing.

All Authorized Drivers should consider the following best practices:

- Utilize a "Back-In" or "First Move Forward" practice when parking a vehicle.
- Review weather conditions prior to travel and avoid driving in adverse conditions. Consider the anticipated road conditions and terrain and ensure the vehicle is fit for purpose.
- Obtain written directions prior to travel in an unfamiliar location.
- Be familiar with and comfortable operating the vehicle to be driven.


To avoid fatigued driving, all Drivers must:

- Plan a 15 minute break after every two hours of driving.
- Not drive more than 8 hours/day.

To avoid fatigued driving, all Drivers should:

- Avoid driving between 10 p.m. and 5 a.m.
- Share driving with others, if possible.
- Avoid driving if doing so will result in more than 12 hours of work-related activities (for example, limit driving to 4 hours after an 8 hour field day; limit driving to 6 hours after 6 hours in the office).
- Avoid driving after a flight of six hours or more without appropriate rest.

Project budgeting and trip planning must consider the above. Local regulations may be more stringent.

	Applicability:	Procedure	Document Number:	Version:
	Global		ERM-1430-PR1	2.2
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4.2.2 Authorized Driver Training

It is the responsibility of the PIC to ensure client-related driver training requirements have been communicated to the project team and implemented. All personnel training required by this procedure shall be documented in ERM Academy.

All Authorized Drivers must certify, on an annual basis, that:

- They have read and understand the requirements of this Procedure; and
- They hold a current driver's license valid in the location where they will be driving.

All Authorized Drivers that operate a vehicle in excess of 5000 km/annum (3100 miles/annum) on company business must receive Defensive Driver training. Refresher training shall be provided once every three years.

It is the responsibility of the BU MP to:

- Develop and maintain a means of tracking an Authorized Driver's annual work related driving (note, this is not required if all Authorized Drivers receive defensive driving training regardless of miles driven)
- Establish a defensive driving training process, in consultation with the Regional H&S Lead.

Drivers that perform the following high risk activities must have specific training on safe methods for completing these activities:


- Towing of equipment or a trailer
- Off-road driving
- Driving a vehicle with GVWR greater than 10,001 lbs

4.3 Vehicle Operation

4.3.1 Minimum Requirements

The following minimum requirement shall apply:

- Passengers and drivers are required to wear available passenger restraints (i.e. seatbelts with shoulder harness) while operating or riding in a vehicle.
- The number of passengers carried shall not exceed the seating capacity specified for the vehicle.
- Transporting people in the bed of a pickup truck is prohibited.
- Smoking within a vehicle is prohibited.
- Loose equipment in passenger compartments, in the back of pickup trucks, and on trailers shall be secured before driving.
- Unattended vehicles (even for a short period of time) shall be locked so that all equipment inside them is secured (verify the vehicle is locked before walking away).

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	Global		ERM-1430-PR1	2.2
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Critical documents and equipment should be removed from the vehicle if unattended or locked in the trunk/boot of the vehicle.

A vehicle used for field work shall:

- Be inspected before the first use onsite and then on a weekly basis afterwards. These inspections shall be documented using the *Vehicle Inspection Checklist*.
- Maintain the minimum safety equipment listed in Section 4.5.

4.3.2 Towing of Trailers or Equipment

No ERM employee shall tow a trailer or equipment without having first received documented training on safe towing methods. The BU MP shall establish a safe towing training process (if required), in consultation with the Regional H&S Lead.

At a minimum, an ERM employee towing a trailer or vehicle shall:

- Refer to and comply with the vehicle owner's manual for safe towing capacity.
- Conduct an equipment inspection prior to use to ensure that weight is distributed evenly and that warning/signal lights are working properly.
- Use a spotter when driving in reverse.

The use of straps or chains for towing purposes is prohibited.


4.3.3 Motorcycles, Motor Bikes and All-terrain Vehicles (ATVs)

At a minimum, the driver of a motorcycle or motor bike on company business shall comply with the following:

- No passengers shall be permitted.
- Driver shall wear a suitable helmet.
- The driver's helmet shall have a face-shield, unless the motorcycle / motor bike is equipped with a windshield.
- Nothing may be carried that is not fully enclosed within a worn backpack or within a permanently installed "saddlebag" or trunk.
- A specific JHA has been completed and approved by the BU MP for the motorcycle / motor bike travel, and no other means of travel is feasible.

ATVs may only be used if a specific JHA has been completed and approved by the BU MP. Three-wheeled ATVs are not permitted for use at any time.

Note that the use of motorcycles, motor bikes, and/or ATVs may be prohibited by certain clients.

	Applicability:	Procedure	Document Number:	Version:
	Global		ERM-1430-PR1	2.2
	Title:	Driver and Vehicle Safety	Last Revision Date:	28 Dec 2016

4.4 Vehicles

4.4.1 Minimum Expectations for All Vehicles

All vehicles used for company business (including vehicles provided by and/or driven by external vendors, clients, etc.) shall be in safe working order and suitable for the task. In addition, the vehicle used shall have a valid vehicle registration, valid insurance coverage and be current on all road taxes (where applicable) in accordance with the local regulatory requirements. Vehicles shall meet the following minimum expectations:

- Anti-lock braking system (ABS)
- Air bags fitted for driver and passenger side
- Three point lap/diagonal seat belts for front and rear outboard seats and lap belts for all other seats;

The PIC is required to specifically document and justify a variance from the above requirements in the travel JHA.

4.4.2 Rented or Hired Vehicles

When possible, the rental company should be a company with which ERM has negotiated rates and contract terms. When renting a vehicle:

- Proof of inspection must be available to the driver.
- If employees cannot rent from a preferred provider with negotiated contract terms, the employee should purchase the collision damage waiver and personal accident insurance.


When hiring a vehicle and driver, ensure that a means for identifying the car and driver has been established prior to pick-up.

4.4.3 Taxi Cabs and other Point-of-Hire Vehicles

Employees should avoid using taxi cabs without seat belts for all passengers. The employees should encourage the driver to wear their seat belt, not use their mobile devices, and follow all posted speed limits and traffic laws. The use of the *Taxi Card* is encouraged.

4.4.4 Personal Vehicle

The use of personal vehicles for driving on ERM business should be avoided. If personal vehicles are used, it is the employees responsibly to ensure that the vehicle has all required licensing and insurance coverage for business use, that all maintenance requirements are met and all safety equipment is available.

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	Global		ERM-1430-PR1	2.2
	Title:	Driver and Vehicle Safety	Last Revision Date:	28 Dec 2016

4.4.5 Company Owned or Leased Vehicles

For any ERM BU with owned or long-term leased vehicles, it is the BU MP's responsibility to formally designate a BU Fleet Manager. The BU Fleet Manager is responsible for the maintenance, inspection and repair of fleet vehicles, including:


- Vehicles shall receive regular, documented maintenance in accordance with the manufacturer's recommended schedule
- Vehicles shall have appropriate and current insurance coverage and road taxes (where applicable)
- Vehicles shall have the following safety equipment, unless a written waiver is received from the RCEO:
 - Anti-lock braking system (ABS).
 - Air bags fitted for driver and passenger side.
 - Head rests for front seats.
 - High-level third brake light.
 - Functional hazard lights.
 - Laminated glass windscreens/windshields and tempered glass side & rear windows.
 - Mirrors, outboard driver and passenger side and internal rear view mirror.
 - Tires must be fit for purpose, terrain and season (i.e., snow, off-road, all terrain), and in good condition (e.g., with suitable tread depth).
 - Spare tire in new or in relatively good condition, and an operational jack.
 - Three point lap/diagonal seat belts for front and rear outboard seats and lap belts for all other seats.
- Vehicle shall be less than five years old and have fewer than 100,000 miles (160,000 km), unless a written waiver from the RCEO has been obtained.

Each BU that maintains a fleet shall maintain a written BU-specific Fleet Management Procedure that documents routine maintenance/inspection procedures to ensure vehicles are in safe operating conditions and is sufficiently detailed to ensure that these minimum requirements are achieved.

4.5 Minimum Safety Equipment

Vehicles used for field work shall maintain the following safety equipment (note: local regulations may require additional equipment):

- First aid kit.
- Spare tire and jack.
- Warning triangles (reflective) or road flares (flares may not be stored in the passenger compartment of the vehicle).
- Reflecting safety vests for all occupants of the vehicle (these should be stored in the passenger compartment and not in the boot/trunk of the vehicle).

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Recommended equipment includes:

- Jumper cables with instructions.
- Torch / flashlight.
- Fire extinguisher
- Camera capabilities (either cell phone, digital, or disposable camera) for incident investigation and documentation.

5. References

- [ERM Global Policy – Mobile/Cellular Telephone and Personal Digital Assistant \(PDA\) Use While in a Vehicle](#)
- [ERM Global Policy – Drug and Alcohol Use](#)
- [ERM-1110-PR1 – Project Health and Safety Planning Procedure](#)
- [ERM-1430-FM1 - Journey Management Plan Template](#)
- [ERM-1430-FM2 – Vehicle Inspection Form](#)
- [ERM-1432-FM1 – Taxi Card](#)

Document Control Information


Original Effective Date: 1 April 2015

Approved by: Gary Beswick on 28 December 2016

Approval Signature: 

Revision History

Section	Version: Reason for Revision	Date
All	1.0: New document.	29 Dec 2014
4.2.1; 4.4.1; 4.4.5	2.0: Included driver 'best practice' considerations and clarified the requirements around driver fatigue management in Section 4.2.1; clarified that the minimum vehicle expectations apply to all vehicles that an ERM employee is riding in Section 4.4.1; modified the requirements on tire tread depth in Section 4.4.5.	20 July 2015
Header	2.1: Modified date to show correct year.	22 July 2015
All	2.2: Updated links, tagline, and document number	28 Dec 2016

	Applicability:	Procedure	Document Number:	Version:
	Global		ERM-1511-PR1	4.2
	Title:	Subsurface Clearance (SSC) Procedure	Last Revision Date:	1 Sept 2017

1. Purpose and Scope

This document establishes the procedures for conducting subsurface clearance (SSC) of utilities and structures prior to any ERM project-related ground disturbance activities.


The SSC Procedure applies to all ERM employees and contractors for any ERM controlled operation, including supervision or oversight, or where ERM is legally or contractually responsible for SSC activities. Where a local regulatory, industry, or client requirement differs from ERM's SSC Process, the stricter requirement shall be adhered to.

When a differing client or regulatory requirement conflicts with or otherwise prevents compliance with the requirements of this procedure (beyond the waivers outlined in Section 5), a project-specific variance plan must be developed by the project team and approved by both the Regional Chief Executive Officer (RCEO) and Local Managing Partner (MP).

2. Roles and Responsibilities

Phase of SSC Activity	Local MP	PIC	PM	EP	GE	Local Safety
Program Management						
Review and approve individuals as SSC Experienced Persons (EPs)	A	C	C	C		C
Mentor SSC General Employees (GEs) and sign Mentorship Cards		I	I	A	R	I
Perform SSC audits - onsite	A	A	I	I	I	A
Project Planning Phase						
Overall project compliance with SSC process	I	A	R	R	I	C
Include appropriate scope of work items and technical requirements in Contractor agreements, including tool/equipment and training requirements		A	R	I	I	C
Determine if project meets Remote-Greenfield criteria		A	R	I		C
Assign Trained and Competent Site Personnel		A	R	I	I	I
Identify and comply with all relevant and appropriate client, legal, and regulatory requirements		A	R	I	I	I
Identify Knowledgeable Site Contact(s)		A	R	I	I	
Project-specific variance plans	A ¹	R	I	I	I	C

¹ Shared accountability with RCEO

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Phase of SSC Activity	Local MP	PIC	PM	EP	GE	Local Safety
Field Execution Phase						
SSC Project Plan		A	R	R	C	
Exercise STOP WORK in the event of any change	A	A	A	A	A	A
Lead Implementation of SSC Process		A	I	R	I	C
Complete SSC Documentation			A	R	I	C
Eyes on Supervision of all SSC field tasks		A	I	R	I	
Communicate SSC Process to site team		A	I	R	I	
Verify Training and qualification of SSC-related Contractor field staff		A	I	R	I	C
Review and approve SSC waivers	A	A	I	I	I	C
Non-Conformance Management						
High Hazard Near Miss or Incident - Onsite Review	C	A	R	I	I	C
Approve re-start after High Hazard Event		A	R	I	C	C
Investigation, RCA and CAPA development	A	R	I	I	I	C
Participate in formal management review meetings associated with SSC near-miss or incident	I	I	I	I	I	I

PIC = Partner-in-Charge

PM = Project Manager

EP = SSC Experienced Person

GE = SSC general Employee

R = Responsible for completing activity – review of work product

A = Accountable for completing activity – approval of work product


C = Consulted when necessary

I = Involved in completing activity, when necessary

NOTE: The Local MP may designate another Partner to serve in these roles, provided the Partner has proper SSC-related experience and current SSC GE or EP Certification. A Technical Director that has proper SSC-related experience and current SSC GE or EP Certification may serve in this role with documented approval of the RCEO.

3. Definitions

Abandoned / Decommissioned – a subsurface structure that has been confirmed by the owner / operator as inactive and in a state of zero energy. For high value / high hazard subsurface structures (as defined later in this section), confirmation must be made on-site by qualified personnel (representing the site and/or owner/operator of the line, unless these entities cannot be

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identified), witnessed by ERM, and include positive verification of a zero-energy state. Otherwise, these lines must be considered potentially active.

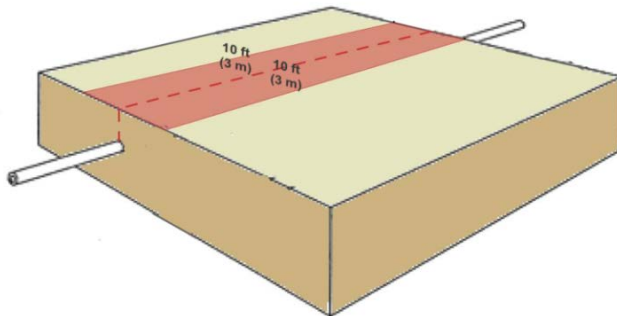
Compressed Air Excavation – The use of compressed air to make a cut, cavity, trench or depression in the earth’s surface. Also known as “Vacuum Extraction,” “Vac-Ex,” “Air Knifing,” and/or “Soft Digging.”

Contact Person – a representative of the site where ground disturbance activities will be conducted who is knowledgeable of the subsurface and/or historical operations at the work location. The contact person may be a client employee or the employee of a third party.

Critical Zone – 10 feet (3 meters) distance in all directions from the surface projection of all known or suspected subsurface structures, taking into account the diameter and spatial extent of the structure (e.g., the outer diameter of a pipe or the outer edges of a tank).

Critical Zones do not apply to structures that have been confirmed as abandoned / decommissioned and do not need to be protected.


Example critical zone illustration, associated with an underground pipe:



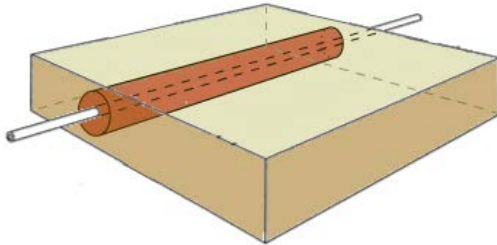
Detection Equipment – any equipment used for the detection of subsurface structures including, but not limited to, devices that utilize electromagnetic detection, magnetic detection, ground penetrating radar (GPR), acoustic detection, and video surveillance (e.g., sewer cameras). Guidance on the selection and applicability of detection equipment is provided in Appendix 3.

Excavation – any man-made cut, cavity, trench, or depression in the earth's surface, NOT including point disturbances as defined later in this section.

Excavation Buffer – a 2-foot (0.6-meter) distance in all directions from the outermost extents of subsurface structures that will be exposed or partially exposed during excavation activities, and within which mechanical digging is prohibited. Excavation Buffers do not apply to structures that have been confirmed as abandoned / decommissioned and do not need to be protected.

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Example illustration of excavation buffer associated with underground line:



Ground Disturbance Activities – activities which require penetration of the ground surface to any depth, and/or the drilling, coring, or removal of engineered surfaces (pavement, concrete, etc.). Examples of ground disturbance activities include, but are not limited to: hand digging, hand augering, drilling, direct-push or Geoprobe® borings, well installation, well over-drilling, excavation, trenching, grading, concrete coring, drilling/installation of soil vapor points, and driving of posts, stakes, rods, poles, or sheet piles.

Hand Augering – Use of a manual auger to make a cavity or depression in the earth's surface.

Hand Digging – Use of manual digging tools and equipment (shovel, trowel, or post-hole-digger) to make a cut, cavity, trench or depression in the earth's surface.

High Value / High Hazard – Subsurface structures including electrical conductors / cable equal or greater than 110V, fiber optic cable, gas lines, petroleum pipelines, or structures containing hazardous substances.


Point Disturbance – ground disturbance activities associated with a distinct and definable location that, in general, will result in a ground disturbance that has a larger vertical extent (i.e. depth) than lateral extent (i.e. disturbed surface area). Examples include but are not limited to locations involving the following activities: soil sampling, soil borings (regardless of diameter) and involving any of the following types of tools/techniques: hand digging, hand auger, drilling, direct-push or Geoprobe®), well installation, and well over-drilling.

Point Disturbance Clearance – Methods used to identify the presence or absence of subsurface structures at a particular point disturbance location by removal of overburden and direct observation and/or contact. Approved point disturbance clearance methods include: compressed air excavation, pressurized water excavation, hand digging, hand auger and soil probe.

Pressurized Water Excavation – The use of pressurized water to make a cut, cavity, trench or depression in the earth's surface.

Remote/Greenfield Site – To be classified as Remote/Greenfield, a site must meet all of the criteria set forth in Appendix 2, as determined by the project PIC.

Site Services Model – a depiction of both the aboveground and underground utilities and services that are present or unaccounted for at a site. The site services model is developed from all available sources of information including, but not limited to: discussions with

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knowledgeable contact persons, review of maps and as-built drawings, observation of visual clues, and information obtained from utility locate services.

Soil Probe Rod – a blunt-nosed probe with a T-handle that is pushed manually into the ground to check for obstructions that may indicate the presence of subsurface structures.

SSC Experienced Person (EP) – an ERM employee with requisite qualifications and experience in performing SSC activities, who will ensure execution of the SSC Process both in the planning stages and in the field.

SSC General Employee (GE) – an ERM employee that works on, manages, serves as PIC, or is responsible for issuing waivers or making other safety-critical decisions on projects where ground disturbance activities are performed, but does not serve in the role of SSC EP.

Subsurface Structures – man-made structures (excluding man-made debris) located beneath the surface of the ground or within or below engineered surfaces., These may include but are not limited to: pipes, cables, conduits, drains, galleries, tanks or other containers, wells, or any other useful property (as defined later in this section).

Useful Property – a subsurface structure that, if damaged, would need to be repaired or replaced, regardless of who makes the repairs or who is liable for the cost.

Unexploded Ordnance (UXO) / Munitions and Explosives of Concern (MEC) – ammunition that was fired but did not explode, or munitions (unfired ammunition, land mines, etc.) that could explode.


4. Procedure

The primary objective of the SSC Process is to develop a complete understanding of the subsurface structures that are present at a project site. This is done by developing a Site Services Model, as defined in Section 3. The activities outlined in this section are performed in order to construct a Site Services Model. These activities are presented in the general order they should be conducted, and are also summarized graphically in the SSC Process Flowcharts in Appendix 1.

4.1 Assignment of an SSC EP to the Project

All SSC planning and field execution activities must be performed or directly overseen by a currently certified SSC EP, unless the project location is a Remote/Greenfield site as defined in Section 3, or a waiver has been issued per the process outlined in Section 5.


The name of the SSC EP must be documented in the SSC Project Plan. The SSC EP role can be shared on a project, provided all employees serving in the role are currently certified as an SSC EP and listed in the SSC Project Plan.

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4.2 Gathering and Review of Site Information

The following steps are required:

- 1) Identify any local regulatory, industry, or client requirements that are not otherwise covered by the ERM SSC Procedure. Document these additional SSC requirements in the SSC Project Plan.
- 2) Assess the potential for the presence of UXO/MEC. If UXO/MEC is present or potentially present, specialist technical assistance must be obtained to assist with project planning and site clearance. In the case of sites where UXO/MEC risks are present, adherence to the clearance plan developed by the specialist provider may supersede certain requirements of the SSC Process. If the UXO/MEC clearance plan deviates in any way from this SSC Procedure, a project-specific variance plan must be developed by the project team and approved by RCEO and Local MP.
- 3) Identify any contact persons knowledgeable of the subsurface and/or historical operations at the work location. Request any available information from them and review the preliminary SSC Project Plan with them. Request the participation of the contact person(s) during the site walk and visual clues survey.
- 4) Obtain all available (and in particular the most recent) as-built drawings and/or site plans showing subsurface structures. Requests should be made and followed up diligently until all available documents are received, or a positive confirmation is given that no such documents are available.
- 5) Where available and/or required by local legislative or regulatory requirements, obtain as-built drawings from third-party public agencies or private companies with subsurface structures in the area where ground disturbance will occur. Requests should be made and followed up diligently until all available documents are received, or a positive confirmation is given by the entities contacted that no such documents are available.
- 6) Obtain and review any additional site-related information such as easements, right-of-ways, historical plot plans, current and historical aerial photographs, fire insurance plans, tank (dip) charts, SSC information obtained as part of previous site investigations or Phase I environmental site assessments, soil surveys, boring logs, etc., as relevant to the planned ground disturbance activities.
- 7) Document the available preliminary information about the presence of known or suspected subsurface structures at the work location in the SSC Project Plan. This must include a site plan or map (drawn to scale) that identifies:
 - a. The routes and locations of known services
 - b. Gaps – those services suspected but not yet located based on currently available information
 - c. Any Critical Zones and/or Excavation Buffers.

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d. The preliminary disturbance location plan (boring location map, excavation plan, etc.) accounting for any Critical Zones, Excavation Buffers, gaps in subsurface information, and project objectives.

- 8) Remote/Greenfield Site Determination. If applicable, the PIC should use the available information obtained in previous steps to determine if the site meets the Remote/Greenfield criteria as defined in Appendix 2. Document this determination in the SSC Project Plan.

4.3 Public Utility Locates

The following steps are required:

- 1) Where they exist, the public utility locator(s) must be contacted to provide all available information and services. In jurisdictions where they provide this service, they should also be asked to physically mark utilities at and/or in the vicinity of the work location, in accordance with local regulatory requirements.
- 2) Ensure compliance with local regulations and guidelines governing public utility locates, including but not limited to:
 - a. The process and required lead times for contacting public utility locators
 - b. Marking planned ground disturbance areas at the work location
 - c. Maintaining any required permits or dig tickets and ensuring public locator markings remain clear and visible for the duration of the project
 - d. Any additional requirements for high hazard/high value subsurface structures
 - e. Any restrictions for excavating within close proximity to underground structures (ie, “tolerance zones”)
 - f. What to do if a subsurface structure or utility is encountered and how to report damage
- 3) Determine if there are utility owners/operators (including municipal water and sewer) that are not subscribers to the public utility service. If there are utility owners/operators that do not subscribe to the service or if a public one-call service is not available, identify and contact the owners/operators of known or suspected utilities in the vicinity of the work area and request they mark area lines.
- 4) Verify a response by each public utility locator prior to proceeding with any ground disturbance activities.
- 5) If, at any time during ground disturbance activities, the public utility locator markouts are not clear or visible, do not agree with other available sources of information, or are suspected to be inaccurate for any reason, the locators must be called back to the site to confirm their markouts.
- 6) Document the activities performed and results of the public utility locate in the SSC Project Plan.

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4.4 Site Walk and Visual Clues Survey


The following steps are required:

- 1) A visual survey of all planned ground disturbance locations and surrounding areas must be conducted to identify signs of potential subsurface structures.
- 2) During the site walk, the routes and locations of services should be confirmed using visual clues, which include but are not limited to the following:

- Utility poles with conduit leading to the ground
- Lights
- Signage
- Sewer drains/cleanouts
- Cable markers
- Utility boxes
- Manholes
- Pavement scarring
- Pipeline markers
- Vegetative evidence (e.g., linear patterns or areas of distressed vegetation)
- Remote buildings with no visible utilities
- Equipment locations
- Fire hydrants
- Sprinkler systems
- Water meters
- Natural gas meters
- Sewer manholes and drop inlets
- Underground storage tanks fill ports and vent pipes
- Steam lines

Elevation changes across the site must also be noted and factored into clearance depth determinations.

- 3) Confirm overhead clearances with equipment operators for safely deploying equipment to the location. The minimum horizontal distance from any point on the equipment to the nearest overhead electrical power line must adhere to the minimum clearance requirements stipulated by regulation, utility companies, client requirements, and/or local industry best practice. If the equipment is closer than the minimum clearance distance to the overhead utility, the utility must be de-energized or an alternate plan developed with approval from the PIC and client/site owner. For more information, refer to ERM's Guidance on Avoiding Contact with Overhead Utility Lines (*ERM-1545-GUI*).
- 4) Where possible and practical (i.e. active industrial sites), work with the site contact(s) to identify the location and individual(s) responsible for key energy isolation devices and shutoff valves for site services. This information is to be included in the SSC Project Plan as part of emergency/contingency planning.
- 5) Whenever available, site contact person(s) are to participate in the site walk and approve planned ground disturbance locations. Approval (or lack thereof) must be documented on the SSC Project Plan.
- 6) Any proposed changes to ground disturbance locations made by a site contact person must be assessed by the SSC EP using the other available lines of evidence and only accepted

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after a determination is made that the change is safe. The SSC Project Plan must be updated and the changes approved by the PIC.


- 7) Similarly, follow-up communication must be made to the site contact person when any changes are made to approved ground disturbance locations without their direct knowledge.
- 8) For Remote/Greenfield sites, if no utilities are identified or suspected during the site walk, and as a result the Remote/Greenfield site status is confirmed, the steps outlined in Sections 4.5 and 4.6 do not apply (except where required by local regulations or client procedures). However, if there is any evidence of the presence or possible presence of subsurface structures or useful property identified at the project location during the site walk, ground disturbing activities must be stopped immediately and the PIC contacted. If the presence of subsurface structures or useful property is confirmed, then the site is no longer considered a Remote/Greenfield site and must be fully risk-assessed using all the required steps in the SSC Process.
- 9) Document the activities performed and results of the visual clues survey in the SSC Project Plan.

4.5 Private Utility Markouts


NOTE: The SSC steps outlined in this section do not need to be completed for Remote/Greenfield sites, except where required by local regulations or client procedures.

The following steps are required:

- 1) Engage a qualified private utility locate contractor or a trained and competent ERM employee to locate and mark subsurface structures on the project site.
- 2) If using a private utility locate contractor, they must be prequalified and approved to conduct private locates through the ERM contractor prequalification process. The PIC and PM must ensure the contractor work order details the type of equipment to be used, mode of operation, reporting requirements (field summary and final) and method of markouts. Further guidance on this, including example work order language, is provided in Appendix 3. Confirm documentation of relevant and currently valid training and experience of all contractor personnel to be used. The SSC EP must be present on site to directly oversee the private utility locate contractors.
- 3) If using an ERM employee to locate and mark subsurface structures, they must have current training documented on ERM Academy to operate the detection equipment to be used, and must be approved by the PIC in the SSC Project Plan.
- 4) All available and site-appropriate detection equipment and methods must be used, and documented in the SSC Project Plan, including noting any limitations in the methods and equipment used. Guidance on the selection and use of detection equipment for private utility locates is provided in Appendix 3.

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- 5) Ensure all detection equipment (whether ERM-owned, rented, or brought to the site by contractors) is:
 - a. Maintained according to manufacturer specifications with maintenance records available.
 - b. Calibrated according to manufacturer specifications. Calibrations must be documented.
 - c. Calibrated or tested at the start of each work day and confirmed to be in proper working condition.
- 6) Detection equipment owned by ERM must be managed in accordance with ERM's Monitoring and Measurement Procedure (*ERM-1934-PR1*).
- 7) A Job Hazard Analysis (JHA) must be developed that covers all utility locating tasks. The JHA must be specific to the equipment and methods to be used, and be reviewed by the SSC EP and PIC.
- 8) Clear any vegetation, vehicles, equipment, or other obstructions to facilitate private utility markouts.
- 9) Using detection equipment, confirm the locations and routes of all identified or suspected subsurface structures, based on the data gathered during the other steps in the SSC process.
- 10) Using detection equipment, scan the area within a minimum 10-foot (3-m) distance around each planned ground disturbance location (a larger, more inclusive distance may be specified in the SSC Project Plan based on input from SSC EP and PIC), to assess the potential presence of any as-yet unknown subsurface structures.
- 11) For electromagnetic tools and equipment, employ active tracing methods whenever possible, using the conductive (direct connection) or inductive method.
- 12) Mark all subsurface structures identified within the defined boundaries of the work area with paint or other semi-permanent markings whose meaning is understood by the project team. Markings must remain clear and visible for the duration of the ground disturbance activities, and re-marked if necessary. Note that markings should be assessed by the SSC EP by evaluating the method(s) used to mark the utility locations, any limitations, and whether or not other lines of evidence corroborate or conflict with the markings.
- 13) The results and findings of the private utility locate must be documented in the field by either the contractor or the SSC EP. If using a contractor, ask that they provide a signed and dated report including a summary of equipment used, mode(s) of operation, names of operators and general map/sketch of findings.
- 14) Document the activities performed and results of the private utility locate in the SSC Project Plan.

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4.6 Final Critical Zone Determination

NOTE: The SSC steps outlined in this section do not need to be completed for Remote/Greenfield sites, except where required by local regulations or client procedures.

The following steps are required:

- 1) In conjunction with site contact person(s), public and private utility locators, and any other knowledgeable persons identified during the site walk, confirm the status of all identified services (e.g., energized/de-energized, active/inactive, idled, abandoned/decommissioned, etc.).
- 2) Use the information gathered from all previous steps in the SSC process to determine the final Critical Zones around each planned ground disturbance location. Update the SSC Project Plan.
- 3) If any disturbance locations (or boundaries of disturbance areas) fall within a Critical Zone, they must be re-located or a waiver must be approved to proceed with work inside the Critical Zone. Any waivers must be documented in the SSC Project Plan.
- 4) For any work inside a Critical Zone, energized pipes or cables must be de-energized. If this is not possible, a specific JHA must be developed that covers the specific task steps, equipment, and methods associated with work around these energized structures. Appropriate safety measures, including the need for specialized PPE, must be evaluated with input from subject matter experts. JHAs must be reviewed by the SSC EP and PIC.


4.7 Review Meeting and Approval of Completed SSC Project Plan

The SSC Project Plan must be reviewed and approved by the PIC after completion of the SSC process steps in Sections 4.1 through 4.6, and BEFORE any further SSC or ground disturbance activities occur. This review must be completed through a verbal conversation, whether in person or by phone or video conference. Documentation of review can be via e-mail initially, but must be followed up with signatures in the final SSC Project Plan. A copy of the SSC Project Plan must be maintained at the work location for the duration of ground disturbance activities, and filed in the project folder upon completion of the field activity.

4.8 Concrete Coring / Cutting

In the case where concrete coring or cutting must be performed prior to ground disturbance, the following steps are required:

1. The preferred course of action is to use a prequalified and approved contractor. Where concrete coring / cutting services are not available for hire, the PIC must determine if there is a sufficiently trained and experienced ERM employee to accomplish the task using rented or ERM-owned equipment. Training documentation must be current on ERM Academy and attached to the HASP, with written approval from the PIC.

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2. A JHA must be developed that covers all concrete coring / cutting tasks. The JHA must be specific to the equipment and methods to be used, and be reviewed by the SSC EP and PIC.
3. Concrete coring / cutting equipment must:
 - a. Be inspected prior to use and maintained according to manufacturer specifications with maintenance records available.
 - b. For rig- or stand-mounted coring equipment, be anchored to the floor using proper anchors.
 - c. Be operated with ground fault circuit protection.
 - d. Be operated by trained and qualified personnel.

Any additional safety requirements for this equipment must be outlined in the task specific JHA.

4. Concrete core diameters must be large enough to allow for visual inspection during subsequent point disturbance clearance. For point disturbance locations that will be advanced with mechanical equipment (e.g., drill rig or direct-push) after initial clearance, core diameters must meet or exceed the larger of: 4 inches or 125% of the outside diameter (OD) of the largest downhole tool to be used.

4.9 Point Disturbance Clearance


Approved equipment and methods to be utilized for point disturbance clearance include the following, listed in order of preference:

- Compressed air excavation
- Pressurized water excavation
- Hand digging tools
- Hand augering tools
- Soil Probe Rod

Blades on shovels and post-hole diggers must have rounded or blunt noses. Pick axes, pointed spades, or any other tool that comes to a point are not to be used for point disturbance clearance. Crow bars, pinch bars or pry bars must not be used to break hardened soil or backfill. The ERM EP or field team lead may authorize the use of bars only to loosen materials like bricks or larger stones so that removal of these materials is possible. Bars must not be used with excessive force.

The following steps are required when clearing point disturbance locations:


1. A JHA must be developed that covers all clearance tasks. The JHA must be specific to the general location of the project as well as the equipment and methods to be used. Unless the project team can positively determine that no subsurface structures are present, all tools and equipment used in the clearance process must be selected based on the potential risks (i.e.,

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energized electrical lines, fiber optic cables, natural gas pipeline, etc.) that cannot be ruled out. In addition to selecting tools and equipment, appropriate safety measures, including the need for specialized PPE, must be evaluated with input from subject matter experts. JHAs must be reviewed by the SSC EP and PIC.

2. Re-verify that appropriate overhead clearance requirements can be maintained at ground disturbance locations prior to mobilizing any equipment.
3. In the case of sites where UXO/MEC risks are present, review and adhere to the clearance plan developed by the specialist provider, which will supersede the instructions in this section.
4. The SSC EP must consider site-specific conditions and soil types when determining the equipment to be used.
5. If a hand auger will be used, an SSC EP must select the appropriate cutting head(s) based on the soil type, and if resistance is encountered that would require an inordinate/atypical amount of force to be applied for advancement, then augering must not continue.
6. For point disturbance locations that will be advanced with mechanical equipment (e.g., drill rig or direct-push) after initial clearance, clearance must be performed as follows:
 - a. Clear the location using one of the approved methods outlined in this section. The selected clearance method must be documented in the SSC Project Plan. ERM's preferred clearance method is compressed air excavation. If this method is not used, the rationale and approval for using one of the other approved methods must also be documented in the SSC Project Plan.
 - b. Clear to a minimum depth as follows:
 1. Outside Critical Zones, to 5 feet (1.5 meters).
 2. Inside Critical Zones, to 8 feet (2.4 meters) at a minimum. However, clearance MUST extend at least 2 feet (0.6 meters) beyond the known or suspected bottom depth of all subsurface structure(s) in the critical zone; therefore it may be necessary to clear to depths greater than 8 feet for deeper structures.
 3. For locations with frozen soils, to 2 feet (0.6 meters) beyond the bottom of the frost line at the site.
 - c. Clear to a minimum diameter that is the LARGER OF:
 1. 4 inches (10 cm); or
 2. At least 125% of the outside diameter (OD) of the largest downhole mechanized tool (e.g. drilling auger, direct-push sampler) to be advanced.

In all cases, clearance diameters must be large enough to allow visual inspection of the cleared hole. If hand augers are used to clear, multiple holes may need to be advanced to achieve clearance diameters.

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- d. For angled (non-vertical) drilling, clear to a minimum diameter of 125% of the OD of the largest downhole mechanized tool, taking into account the angle of the boring.
 - e. For locations where difficult soil or geologic conditions prevent the full clearance of a point disturbance location, a waiver must be obtained prior to proceeding with mechanized equipment. The waiver can be applied to multiple point disturbance locations across the site, provided each location is specified in the SSC Project Plan.
8. During clearance (and subsequent ground disturbance activities), watch for any warning signs indicating non-native soil, fill materials, and/or the presence of unexpected subsurface structures. If warning signs are observed, work must be stopped, the PM and PIC contacted, and this change managed per the requirements outlined in Section 8. Warning signs may include, but are not limited to:
- a. Any at-grade or above-grade visual clues
 - b. Refusal
 - c. Warning tape
 - d. Pea gravel / sand / non-native materials
 - e. Red concrete
 - f. Colored plastic covers
 - g. Voids/ cavities, or abrupt absence of soil
 - h. Any unexpected change from native soil
 - i. Any signs of damaged utilities in cuttings (broken materials, odors, etc.)
 - j. Any other unexpected condition

4.10 Excavations

Blades on shovels and post-hole diggers must have rounded or blunt noses. Pick axes, pointed spades, or any other tool that comes to a point are not to be used for excavation. Crow bars, pinch bars or pry bars must not be used to break hardened soil or backfill. The ERM EP or field team lead may authorize the use of bars only to loosen materials like bricks or larger stones so that removal of these materials is possible. Bars must not be used with excessive force.

The following steps are required:

1. JHAs must be developed that cover all excavation / trenching tasks. The JHA must be specific to the general location of the project as well as the equipment and methods to be used. Unless the project team can positively determine that no subsurface structures are present, all tools and equipment used must be selected based on the potential risks (i.e., energized electrical lines, fiber optic cables, natural gas pipeline, etc.) that cannot be ruled out. In addition to selecting tools and equipment, appropriate safety measures, including the need for specialized PPE, must be evaluated with input from subject matter experts. JHAs must be reviewed by the SSC EP and PIC.
2. For excavation involving removal or working in close (2 feet / 0.6 m) proximity to subsurface structures (including those that are abandoned / decommissioned), the JHA must include appropriate emergency response measures, any additional personal protective

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equipment, and safe excavation and removal methods to prevent spills, damage to other structures, etc.


3. Inform all ERM field personnel and excavation contractor(s) of information regarding the location of subsurface structures, Critical Zones, and Excavation Buffers. Ensure that the following are clearly marked and communicated to all site personnel, for all subsurface structures crossing through the excavation/trench perimeter or located within the Critical Zone around the excavation/trench perimeter:
 - a. Locations/routes, including Excavation Buffers
 - b. Expected excavation depths to the Excavation Buffer
4. During ground disturbance activities, watch for any warning signs indicating non-native soil, fill materials, and/or the presence of unexpected subsurface structures. Warning signs may include, but are not limited to:
 - a. Any at-grade or above-grade visual clues
 - b. Refusal
 - c. Warning tape
 - d. Pea gravel / sand / non-native materials
 - e. Red concrete
 - f. Colored plastic covers
 - g. Voids/ cavities, or abrupt absence of soil
 - h. Any unexpected change from native soil
 - i. Any signs of damaged utilities in cuttings (broken materials, odors, etc.)
 - j. Any other unexpected condition
5. Material inside an Excavation Buffer can ONLY be removed by the following methods (this is not subject to waiver):
 - a. Compressed air excavation or pressurized water excavation (only with documented approval from the owner/operator of the utility or structure, and where allowed by law)
 - b. Hand digging tools

5. Waivers

There are four waivers to the SSC Procedure that can be granted:

1. Waive the requirement for an SSC EP to oversee execution of the SSC Process (this could include the entire project or specific tasks);²

² An SSC EP is not required to oversee SSC activities at Remote/Greenfield sites, as defined in Section 3 and Appendix 2. A waiver is not needed for these sites.

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2. Waive the requirement for private utility locates (performed by ERM contractors or ERM employees);
3. Waive the requirement for clearance of point disturbance locations prior to advancing with mechanized equipment (including no clearance or partial clearance); and
4. Waive the requirement prohibiting ground disturbance activities within a Critical Zone.

Both the Project PIC AND Local MP (or designee) must approve any waivers, with documentation in the ERM SSC Project Plan (can be documented in the field via notation of verbal approval or e-mail, with signature after project completion). If the Local MP is also the PIC on the project, then they must delegate the second review to another SSC Certified Partner and BOTH must approve the waiver.

PICs and Local MPs (or designees) must work with the SSC EP and broader project team to ensure the SSC Procedure is executed and to use available information to make safe decisions regarding waivers. A member of the H&S Team and/or a locally identified subject matter expert (SME) may also be consulted regarding waiver decisions, in particular when the project involves some degree of complexity or uncertainty. Additional guidance on conducting this evaluation is presented in Appendix 4, along with illustrative examples of waiver decisions.

Waivers should only be issued when exceptional circumstances limit the execution of parts of the SSC Procedure. PICs and Local MPs (or designees) cannot waive compliance with any legislative or regulatory requirement; nor can they waive any client-mandated requirements without prior discussion with, and documented approval by, the authorized client representative.

6. Training and Competency Requirements


There are two levels of certification for ERM staff engaged in SSC activities:

SSC GE Certification. SSC GEs (as defined in Section 3) must be certified by completing all of the requirements of the SSC GE Certification on ERM Academy and maintaining a status of “Certified / Renewal in Progress.” Current requirements for SSC GE Certification are summarized in Appendix 5.

SSC EP Certification. Employees who will serve in the role of SSC EP must be certified as SSC EPs by completing all of the requirements of the SSC EP Certification on ERM Academy and maintaining a status of “Certified / Renewal in Progress.” Current requirements for SSC EP Certification are summarized in Appendix 5.

The Local MP must assess the skills and experience level of all prospective SSC EPs and provide documented approval to the ERM Academy Team in order for an employee to become fully certified as an SSC EP. The Local MP may also revoke SSC EP certification, at their discretion, based on feedback from others, inability of the EP to demonstrate competency, or other identified performance issues.

SSC GEs that lack the qualifications and experience to be SSC EPs must participate in mentoring to develop the skills and experience to become SSC EPs. SSC GEs can utilize the “SSC

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Mentorship Card” template (*ERM-1511-FM3*) to document field mentoring received by different SSC EPs.

ERM employees and contractors operating detection equipment must have experience and current training specific to the equipment they will be operating. Documentation of currently valid training must be obtained and included with the project HASP and in the project files. Training records for ERM employees must also be documented in ERM Academy.

If subsurface or overhead utilities will be de-energized by ERM employees or contractors, they must have formal and documented training for their role as required by local legislation and/or regulation.

Each region must develop a list of approved instructors for ERM SSC training, to be approved by the Regional H&S Leader in consultation with the regional management team.


Any changes to SSC training requirements are communicated to all affected employees via the ERM Academy Certification process.

7. Documentation

Thorough and complete documentation of the execution of the SSC Procedure must be maintained at the project site for the duration of ground disturbance activities, with copies maintained in the project files.

Documentation and forms associated with the SSC Procedure include the following:

- **SSC Project Plan (ERM-1511-FM1)** – this plan is required for each phase of ground disturbance activities at a project site. The SSC Project Plan includes the scope of authorized ground disturbance and SSC activities to be performed, available sources of information, summary of subsurface structures, documentation of SSC field activities, and approval of any waivers. The completed SSC Project Plan must be reviewed and approved by the PIC before any point disturbance clearance or ground disturbance activities may begin. If waivers will be granted, the SSC Project Plan must also be approved and signed by the Local MP or designee. Approvals can be initially documented in the field via notation of verbal approval or e-mail, with signature after SSC completion.
- **SSC Project Plan for Remote/Greenfield Sites (ERM-1511-FM2)** – version of the SSC Project Plan that can be used as an alternative for Remote/Greenfield sites, as defined in Section 3 and Appendix 2.
- **SSC Audit Form (ERM-1511-FM3)** – used to conduct and document field audits of SSC projects.
- **SSC Mentorship Card (ERM-1511-FM4)** – can be used by SSC GEs to document field mentoring received by different SSC EPs.

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- **SSC Review Checklist for Contractors (ERM-1511-FM5)** – used to conduct and document safety meetings with contractor field personnel, to ensure they have been properly briefed on the applicable components of ERM’s SSC Process.
- **SSC EP Review Questionnaire (ERM-1511-FM6)** – used to conduct and document Local MP review of a prospective SSC EP candidate’s experience and competency.

Client required forms and/or equivalent field notes and sketches may be used in place of the SSC documentation outlined in this section, provided that the level and quality of documentation meets or exceeds that of ERM’s forms, as determined and documented by the SSC EP and approved by the PIC.


8. Management of Change

Any change that occurs during the execution of the SSC Procedure or subsequent ground disturbance activities must be managed safely and effectively. Examples of change may include, but are not limited to:

- Changes to the location, scope, extent, or depth of ground disturbance activities
- Changes to the equipment or methods used
- Changes in personnel
- Changes in schedule
- Changes in encountered field conditions, including subsurface conditions (e.g., change in soil type or refusal)
- Safety events

To manage change:

1. Work must be stopped or paused and the PIC and PM contacted. As warranted based on the nature of the change (see below for additional guidance), a member of the Safety Team should also be contacted.
2. A re-assessment of the risks must be conducted with the input of the PIC, PM, and SSC EP (or field team lead for sites with no EP assigned). Additional input must be sought from the Local Managing Partner or designee for waivers, and a member of the Safety Team should also be consulted as warranted based on the nature of the risks involved.
3. SSC project documentation must be updated as necessary to reflect the change(s). The HASP, JHA(s), and other Safety planning documents must also be updated as necessary.
4. Any site or client contacts must also be notified of the change(s).
5. Work cannot be re-started without the concurrence of the PIC, PM, and SSC EP (or field team lead for sites with no EP assigned).

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9. Safety Events

SSC-related safety events must be reported, managed, and investigated in accordance with ERM's Event and Non-conformity Management Procedure (*ERM-1200-PR1*) and Event Investigation Procedure (*ERM-1220-PR1*).

ERM classifies SSC-related safety events as follows:

1. **Incident:** Any injury, illness, damage to useful property, fire, explosion, spill, or other consequence that results from intercepting a subsurface utility or structure, either during the SSC process or subsequent ground disturbance activities.
2. **Near Miss:** Any unexpected encounter with a subsurface utility or structure that is verified as not damaged, or is determined to be NOT useful property (e.g., abandoned) and therefore does not require any repair or replacement.

If a subsurface structure is intentionally exposed through use of a proper clearance technique to verify its location (or to comply with Excavation Buffer requirements), this is NOT considered a near miss. If a subsurface structure is intentionally exposed in order to excavate and remove it, this would also not be considered a near miss.


Also, refusal caused by rocks, difficult geology, debris, or other natural matter is not considered a near miss.

Due to the inherent uncertainty associated with SSC, it is possible that unexpected encounters with previously unidentified subsurface structures may occur during clearance, even after having successfully completed all other required steps in the SSC Process. If, however, it is determined that there were deviations or a lack of diligence in the execution of the SSC Process that may have contributed to the near miss, and/or if there are potential significant learnings to be shared within the organization, then the event can be classified as a "high-learning value" near miss. This classification can be made by the SSC EP, PIC, Regional Safety Leader or Global Health and Safety Director (GHSD).

3. **Observation:** Any actions or conditions that contradict or reduce the protections to health and safety outlined in the SSC Process; OR, any behaviors or best practices that significantly enhance the protections to health and safety beyond those outlined in the SSC Procedure.

In addition to the requirements outlined in ERM's Event and Non-conformity Management Procedure and Event Investigation Procedure, the following requirements apply in the event of an SSC-related incident or near miss:

1. In the event of ANY unexpected encounter with a subsurface structure, immediately contact the owner/operator so they can de-energize or shut off the service(s), as warranted, and assess any potential or actual damage and discuss the need for any repairs. The owner/operator must be contacted EVEN IF we believe no damage has occurred. ERM employees and contractors will not attempt to assess the status of any potential damage, or attempt to make any repairs without the involvement of the owner/operator (unless ERM is the owner/operator and a trained ERM employee is available to de-energize or shut off the

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service). In the event of contact or potential contact with a subsurface structure, ERM and contractor personnel must observe a no touch principle. The service is to be considered live and potentially damaged, therefore hazardous, until investigated by a specialist.

2. In the event of an incident or near miss involving high hazard/high value subsurface structures, the PIC must go to the site as soon as practical to lead follow-up activities and initiate the investigation. For all other incidents or near misses, the PIC must consult with the Local MP and Local H&S Lead to determine if a PIC visit to the site is necessary.
3. A Root-Cause Analysis (RCA) is required for all SSC-related incidents and “high-learning-value” near misses. The investigation, RCA, corrective and preventive actions, and Safety Alert must be completed in accordance with the Event Investigation Procedure (*ERM-1220-PR1*) (or in accordance with client or regulatory requirements as applicable).

10. Auditing


To help assure safe operations on ERM SSC projects, audits will be conducted at a minimum as outlined below, using ERM’s SSC Audit Form (or client-required equivalent form).

- Each Local MP (or designee) responsible for granting SSC Process waivers must perform a minimum of one SSC audit per year. This audit must be conducted in the field to observe the implementation of the SSC process.
- SSC PICs must audit at least one SSC project per year (unless they do not serve as PIC on any SSC projects during that year). This audit must include both an office review of documentation and field review of implementation.
- Regional and/or Local H&S Leaders must perform at least two SSC audits per year. These audits must include both an office review of documentation and field review of implementation.

SSC audit findings must be entered into ERM’s online Active Leadership Audit Program (ALAP) system to allow for data trending, awareness and communication of lessons learned. Any identified corrective and preventative actions (CAPAs) must be entered into ERM’s online CAPA database, which is used to assign, track and close CAPAs. It is the responsibility of the PIC to ensure that all CAPAs are completed by the assigned due date(s).

11. References

- [ERM-1511-FM1 - SSC Project Plan](#)
- [ERM-1511-FM2 - SSC Project Plan for Remote/Greenfield Sites](#)
- [ERM-1511-FM3 - SSC Audit Form](#)
- [ERM-1511-FM4 - SSC Mentorship Card](#)
- [ERM-1511-FM5 - SSC Review Checklist for Contractors](#)
- [ERM-1511-FM6 - SSC Experienced Person \(EP\) Review Questionnaire](#)


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- [ERM-1545-GU1 - Guidance on Avoiding Contact with Overhead Utility Lines](#)
- [ERM-1200-PR1- Event and Non-conformity Management Procedure](#)
- [ERM-1220-PR1 - Event Investigation Procedure](#)
- [ERM-1934-PR1 - Monitoring and Measurement Procedure](#)

Document Control Information


Version 4 Effective Date: 1 September 2017

Policy Approval by: Gary Beswick on 1 June 2017

Approval Signature: 

Revision History

Section	Version No: Reason for Revision	Date
All	2.0: Major Revision	Sept 2009
All	3.0: Major Revision.	April 2013
All	3.0: Clarified near miss reporting	October 2013
All	3.1: Formatted for upload to Document Control System (DCS); added approval signature block for GHSD; Modified language in Appendix A flowchart for physical clearance requirements to match procedure text; removed field forms for upload to DCS as separate controlled documents	February 2015
All	3.2: Clarified applicability of SSC Process as it applies to contractors and third parties, inundated areas, areas covered by snow/ice, and UXO/MEC; removed 1 foot (0.3 meter) depth exemption from definition of ground disturbance; clarified definition of intercept / near miss related to abandoned structures designated for removal; added reference to SSC Field Review Checklist for Contractors; added waiver for SSC EP presence when hand digging in uppermost 1 foot; made other minor revisions for clarity but without changing content.	March 2015
All	4.0: Re-formatted. Removed public locate waiver. Modified SSC EP waiver. Merged SSC Project Plan with SSC Field Checklist forms. Removed SSC Location Disturbance Permit. Made explicit requirement for PIC/PM approval of SSC project Plan after completion of certain steps in SSC process. Removed references to "non-conductive" tools. Revised SSC flow chart in Appendix 1. Numerous other changes to respond to incident trends.	May 2017
4.8	4.1: Clarified core diameters must meet or exceed 'the larger of 4 inches or' 125% OD.	June 2017
11	4.2: Updated all links to post official version to DCS.	Sept 2017

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Appendix 1: SSC Process Flow Charts

Main Process Steps

- Ensure all project personnel meet SSC EP and/or GE training requirements. Assign an EP to the project.*
- Identify knowledgeable contact person(s). Request any available information from them and review preliminary Site Services Model with them.
- Obtain all available and relevant site-related information
- Conduct public utility locates (where available)
- Conduct a site walk with knowledgeable contact person(s) and visual clues survey of planned ground disturbance locations and surrounding areas
- Conduct private utility locates to locate and mark utilities on the project site*
- Determine Critical Zones*
- **Review completed SSC Project Plan with PIC, before any ground disturbance activity occurs**
- Clear each point disturbance location prior to using any mechanized equipment. Adhere to Excavation Buffers for excavations and trenches.

Documentation

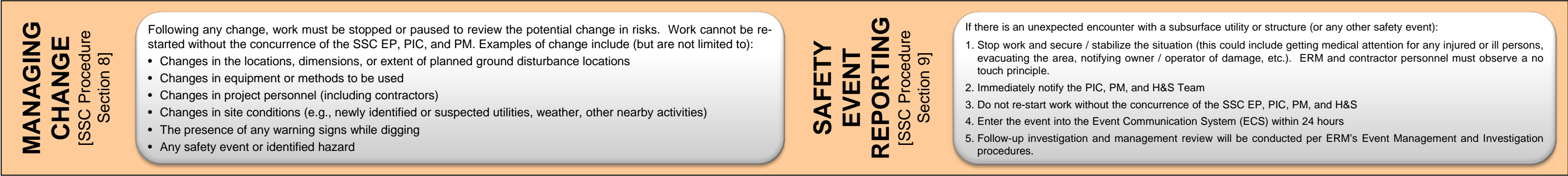
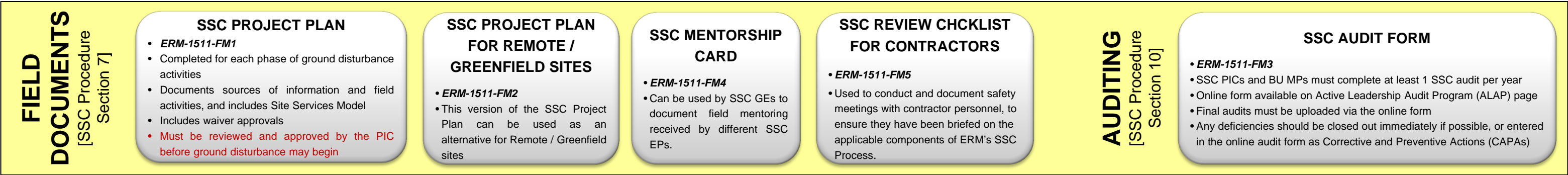
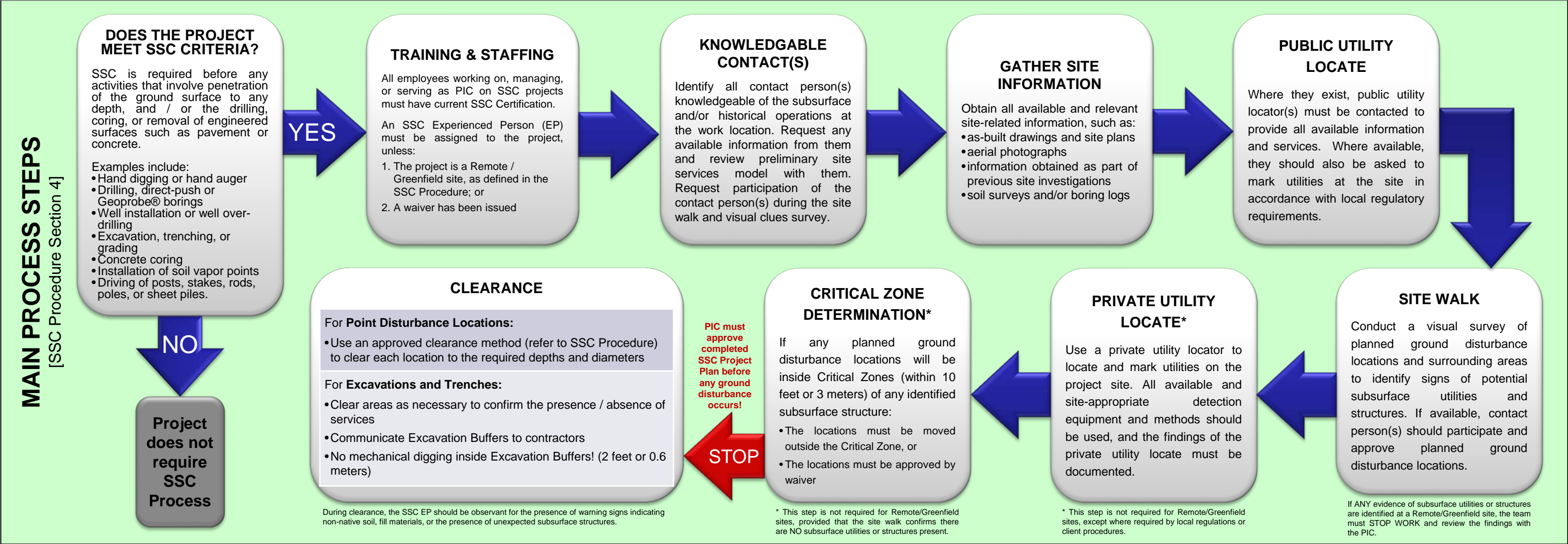
- SSC Project Plan (ERM-1511-FM1)
- SSC Project Plan for Remote/Greenfield Sites (ERM-1511-FM2)
- SSC Audit Form (ERM-1511-FM3)
- SSC Mentorship Card (ERM-1511-FM4)
- SSC Review Checklist for Contractors (ERM-1511-FM5)
- SSC EP Review Questionnaire (ERM-1511-FM6)


Managing Change

- Following any change, work must be stopped or paused to review the potential change in risks.
Work cannot be re-started without the concurrence of the SSC EP, PIC, and PM.
Examples include: Changes in the locations, dimensions, or extent of planned ground disturbance locations; Changes in equipment or methods to be used; Changes in personnel; Any safety event or identified hazard

* - Step not required for Remote / Greenfield projects

Subsurface Clearance (SSC) Process – Detailed Flow Chart
ERM-1511-PR1 – Appendix 1



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Appendix 2: Remote/Greenfield Site Criteria

Remote/Greenfield sites are those situated in remote/rural or wilderness areas, where ONLY hand digging or hand augering is to be conducted. To be classified as a Remote/Greenfield site (or to classify portions of a larger site as Remote/Greenfield), the Partner-in-Charge (PIC) of the project must possess sufficient knowledge and experience to evaluate the site based on the following criteria and be able to determine the possible presence or absence of subsurface structures.

For a site to be classified as “Remote/Greenfield”, the answer to ALL of the following questions must be “NO.”

1. Will the scope of ERM or contractor activities include any form of mechanical digging/excavation, or the drilling, coring, or removal of engineered surfaces such as pavement or concrete?
2. Did a review of the most recent available maps and aerial photos or historical maps or aerial photos indicate the presence of anthropogenic activity that might have resulted in the presence of subsurface structures or useful property?
3. Is the site used for commercial purposes (excluding field agriculture or tree planting/harvesting) or was it so used based on the review of available maps and aerial photos?
4. Is the proposed site within 1.0 kilometer of a developed area (town, city or other large human settlement) that exceeds more than 50 inhabitants?
5. Is the proposed site within 100 meters of an isolated habitation dwelling (defined as the only habitation dwelling within 500 meters)?
6. Unexploded Ordinance/Munitions of Explosive Concern (UXO/MEC) risks have been assessed and UXO/MEC is present or potentially present?


Remote/Greenfield site status must be confirmed in the field by completing the site walk and visual clues survey as outlined in Section 4.4 of the SSC Procedure. If any evidence of subsurface structures is identified, the site must no longer be considered a Remote/Greenfield site.

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Appendix 3: Guidance on Selection and Use of Detection Equipment

3.1 Work Order Instructions for Private Utility Locate Contractors


- Below is example language that can be incorporated into work orders, work authorizations, or subcontract agreements for private utility locate contractors. Utility locates must be performed by qualified, trained, and competent personnel. Documentation of training and experience for all on-site personnel must be provided to ERM in advance.
 - No work of any kind is to be performed at the project location without authorization and direct oversight of ERM personnel.
 - A JHA or similar document must be developed for all tasks and provided to ERM in advance for review.
 - All equipment must be:
 - Maintained according to manufacturer specifications with maintenance records available.
 - Calibrated according to manufacturer specifications. Calibrations must be documented.
 - Calibrated or tested at the start of site activities.
 - At a minimum, the following types of equipment are to be brought to the site and used to locate utilities (*note: it is best to develop this list in consultation with the private locator*):
-
- For electromagnetic tools and equipment, active tracing methods are to be used whenever possible, using the conductive (direct connection) or inductive method.
 - For ground penetrating radar (GPR), the following depths need to be achieved / antennae frequencies used (*note: it is best to develop this list in consultation with the private locator*):
-
- Based on the site information provided, the locations and routes of all identified or suspected subsurface structures must be confirmed.
 - The area within a minimum 10-foot (3-m) distance around all planned ground disturbance locations shall be assessed for the potential presence of any structures (NOTE: a larger, more inclusive distance may be specified as warranted).
 - All identified or suspected subsurface structures within the defined boundaries of the work area shall be marked with paint or other semi-permanent markings in accordance with local regulatory, client, or industry standards.
 - A signed and dated report must be provided upon completion of activities, including a summary of equipment used, mode(s) of operation, names of operators and general map/sketch of findings.

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3.2 Applicability Matrix

The following guidance should be used as a starting point to assess potentially applicable detection equipment for a project. Each project may have unique conditions, therefore do not use this table as the sole decision criteria for technology selection.

Technology →	Electro-Magnetic Detection ¹					Ground Penetrating Radar (GPR) ³	Acoustic Plastic Pipe Locator	Cesium Magneto meter ⁴
	Cable Avoidance Tool (CAT)			Ground Conductivity Meter (e.g., EM-31 or EM-61)	Probe, Beacon, Sonde, or Trace Wire			
Subsurface Utility / Structure ↓	Passive – “Power” Mode ²	Passive – “Radio” Mode ²	Active Mode Using Signal Generator ²					
Electric / Instrument Line (Energized/Signaled ⁵)	G	G	G	R	R	Y	R	Y
Electric Line (Non-energized)	Y	Y	G	R	R	Y	R	Y
Sewer/Water Line (Metallic)	Y	Y	G	Y	G	>12" diameter G	Y	Y
						<12" diameter Y		
Sewer/Water Line (Non-metallic)	R	R	R	R	G	>12" diameter G	G	Y
						<12" diameter Y		
Instrument/Telecomm (Non-energized)	R	R	Y	R	R	Y	R	R
Fiber Optic Cable	R	R	R	R	Y ⁶	R	R	R
Fiber Optic w/tracer or in with a group of cables	G	Y	Y	Y	N/A	Y	R	
Natural Gas (Metallic)	G	G	G	G	R	>12" diameter G	R	G
						<12" diameter Y		
Natural Gas Line (Non-metallic/PVC) ⁷	R	R	R	R	R	>12" diameter G	R	R
						<12" diameter Y		
Metallic/Non-Metallic Line (w/Tracer Wire)	G	G	G	Y	Y	>12" diameter G	Y	Y
						<12" diameter Y		
Metallic/Non-Metallic Line (w/o Tracer Wire)	R	R	Y	Y	Y	>12" diameter G	Y	R
						<12" diameter Y		
Metal UST	Y	Y	G	G	R	G	R	G
Fiberglass UST	R	R	R	R	R	G	R	Y

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Additional Considerations

Technology →	Electro-Magnetic Detection ¹					Ground Penetrating Radar (GPR) ³	Acoustic Plastic Pipe Locator	Cesium Magneto meter ⁴
	Cable Avoidance Tool (CAT)			Ground Conductivity Meter (e.g., EM-31 or EM-61)	Probe, Beacon, Sonde, or Trace Wire			
Variable ↓	Passive – “Power” Mode ²	Passive – “Radio” Mode ²	Active Mode Using Signal Generator ²					
Moist Soil	G	G	G	Y	G	Y	G	Y
Dry Soil	Y	Y	G	Y	G	G	Y	G
Clay	Y	Y	Y	Y	G	R	G	Y
Concrete w/Rebar	R	R	Y	R	G	Y	G	R
Man-made fill such as construction/demolition debris, coal ash, slag, etc	Y	Y	Y	Y	G	Y	Y	Y
Long Horizontal Profile	G	G	G	G	G	G	G	G
Short Horizontal but Deep Vertical Profile	Y	Y	Y	Y	R	G	R	G
Access to Line ⁸	G	G	G	N/A	G	N/A	G	N/A
No Access to Line ⁸	Y	Y	R	G	R	G	Y	G
Ferrous Metal	G	G	G	G	G	G	G	G
Non-ferrous Metal	Y	Y	G	Y	G	G	G	Y

Green (G): Generally an applicable technology

Yellow (Y): May or may not be applicable

Red (R): Not generally applicable

1 = Site structures, rebar in concrete, etc. can significantly affect performance and reliability of any electromagnetic method.

2 = The CAT can be used in 3 modes:

- In the Power mode, the CAT can detect signals radiated by loaded cables. This is used to detect, locate and avoid buried electrical cables.
- In the Radio mode, the CAT detects VLF radio signals re-radiated by buried metallic pipes and cables. This is used to detect, locate and avoid other buried metallic pipes and cables such as natural gas, phone & communication lines, ducts & water services.
- In the Active mode, the CAT detects a tone radiated by a signal generator (“Genny”) to a buried conductor. This is done by directly connecting the signal generator to the source via plug sockets, valves, etc.

3 = Most sensitive to interpretation and soil conditions; the skill, training, and experience of operator are critical. Also note that the size and power of GPR antenna arrays can provide variable results and pick up signals at different depth ranges.


4 = Sensitive to noise and operator error. Generally more applicable for large targets.

5 = Metallic lines that have power running through them or can be connected to a tracer signal generator. Caution should be exercised when attaching a transmitter to high-voltage lines for active trace with CAT.

6 = If the fiber optic cable is in a conduit, it may be possible to trace the line using a probe


7 = Assumes no tracer wire installed through which a signal can be induced.

8 = Access: induce unique electronic signature, apply acoustical impulse, or insert probe/beacon/sonde.

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3.3 Additional Considerations

- Communicate the detailed scope of work and review all available SSC information with private locators in advance, prior to mobilizing to the site. This way they can bring the right equipment and schedule sufficient time to achieve the clearance objectives.
- Provide all available information to locators to help them confirm the routes of all known or suspected services. This includes but may not be limited to: as-builts, public locator responses/markings, knowledgeable site contact(s) information, and results of visual cues survey.
- Ensure that utility locators are thorough and use multiple tools and methods. Ground penetrating radar (GPR) surveys should be used wherever possible.
- Consider the need to perform at least two different depth scans with GPR: (1) a higher frequency near-surface scan and (2) a lower-frequency scan within the target depth range for site services. This is especially critical for sites with shallow buried utilities and/or concrete slabs or other engineered surfaces, where utilities may be direct buried within or directly below the surface.
- For electromagnetic (EM) location, insist on active tracing methods using conduction or induction of a signal wherever possible.
- Ask the private locators about any issues or limitations with their surveys, especially if other lines of evidence conflict with their markings, or if they cannot identify known or suspected subsurface structures.

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Appendix 4: Waiver Guidance Examples

Introduction

“Reasonably assured” denotes the standard that must be satisfied for Partners-in-Charge (PICs) and Local Managing Partners (MPs) or their designees to grant waivers to the execution of (or, more precisely, make an explicit decision to allow non-performance of) portions of the Subsurface Clearance (SSC) Procedure. There are four waivers to the SSC Procedure that can potentially be granted:

1. Waive the requirement for an SSC EP to oversee execution of the SSC Process (this could include the entire project or specific tasks;³
2. Waive the requirement for private utility locates (performed by ERM contractors or ERM employees);
3. Waive the requirement for clearance of point disturbance locations prior to advancing with mechanized equipment (including no clearance or partial clearance); and
4. Waive the requirement prohibiting ground disturbance activities within a Critical Zone.

This guidance is intended to present a risk-based framework through which being “reasonably assured” may be assessed.

Definition and Factors to Consider


Being “reasonably assured” means that one would make the same decision as another PIC concerning a waiver, based on the same set of factors. PICs and Local MPs (or designees) should integrate the following two factors into their decisions to issue a waiver:

1. Available pieces of information/data about the services present in the subsurface, and quality of that information/data.
2. Relative hazard of striking the services known or suspected to be present (i.e., not confirmed as absent from the site).

The relative hazard of striking a service can be prioritized in terms of the potential severity of such a strike in terms of health, safety, or environmental consequences. For relatively low-hazard services, the potential cost implications of repair can also be considered. All other things being equal, an example prioritized list of common underground services – from high hazard to low hazard – might include:

- a. High / medium voltage electrical cables
- b. Low voltage electrical cables

³ An SSC EP is not required to oversee SSC activities at Remote/Greenfield sites, as defined in Section 3 and Appendix 2. A waiver is not needed for these sites.

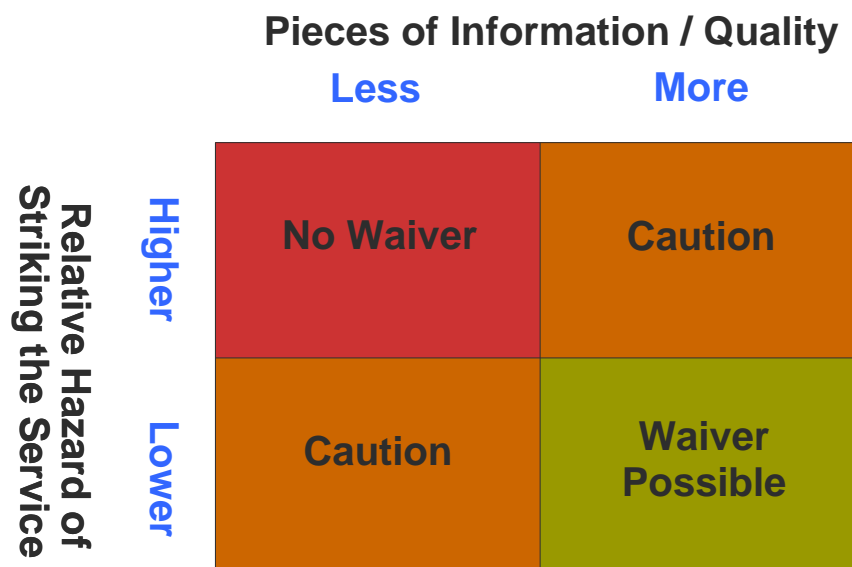
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- c. Pressurized gas lines
- d. Other pressurized pipelines
- e. Fiber optic cables
- f. Gravity drain process sewers
- g. Gravity drain sanitary sewers
- h. Gravity drain storm sewers

The particular circumstances of the site (e.g., active or inactive facility), whether or not the lines are energized, and whether or not the routes of the services are known or would meet the definition of “Useful Property” may change the relative hazard ranking.

Multiple, high-quality pieces of information/data and low relative hazard support granting waivers. Limited and/or low-quality lines of evidence and high relative hazard do not support granting waivers. This can be illustrated using the following diagram:


The Waiver Matrix



The way in which these factors are considered can be illustrated by the example below.

Example Project

An ERM team has been awarded a project to assess suspected impact at an inactive manufacturing site. The client previously demolished all surface structures, but did not fully address the process sewer. Some surface clues are present. The project team is planning to complete 25 soil borings along the run of the former process sewer (due to regulatory requirements, samples must be taken within 1 m of the sewer lines) looking for potential impact.

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The site is known to be constructed over man-made ground, and debris – both from historical operations and the recent demolition – is widespread over the site in the 0-1 meter depth interval.

The SSC Procedure first asks the project team to evaluate the available information sources about subsurface risks. This is memorialized in the Project Information Summary section of the SSC Project Plan. The more information sources that are checked “Yes” indicates more lines of evidence potentially established. Comments regarding the quality or reliability of those lines of evidence should also be noted and weighed in subsequent decisions.

Project teams are also asked to assess the potential underground services at a site. The goal is to ultimately confirm either the presence or absence of such services from the work area. The presence / absence and knowledge of the routes of subsurface services on the Example Project site are noted in the Site Services Model, as shown in the following example:

Example Project Site Services Model (Pre-Mobilization for Drilling)

Site Services Model								
Utility / Structure	Present?			Anticipated depth (note units)	Located?		Status (active, inactive, abandoned, etc)	Comments (For each, describe how located and quality of information available)
	Yes	No	Un-known		Yes	No		
Electricity	x			2m	x		De-energized from substation	On Site Plan; public util. markouts confirm
Gas	x			2m	x			Present on site, but blinded at street
Petroleum Pipeline		x						Not present
Other Pressurized Lines	x			1m		x		H2 pipeline crosses former process area
Process Sewer	x			1m	x		Deactivated, but not abandoned	On Site Plan
Sanitary Sewer	x			??		x	Deactivated, cut and blinded at street	On Site Plan
Storm Sewer		x					Previously abandoned by client	On Site Plan
Potable Water		x						Not present
Telephone / Communication		x						Per phone company, none on-site
Fiber Optic		x						Not present
Plant air / steam		x						Not present
Fuel / oil		x						Not present
Reclaimed / waste water		x						Not present
Fire suppression		x						Not present
Underground tank(s)		x						On Site Plan; public util. markouts confirm
Other (Describe):		x						

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Decisions on granting waivers should be based on considerations of what is known (or will be known, based on planned work activity) and what risks are present from the identified services at the site.

In this case, there are three potential waiver decisions for the PIC and Local MP (or designee) to make:

- Waiving the private utility mark-out,
- Waiving the need for point disturbance clearance, and
- Advancing within Critical Zones (within a 3-meter envelope of a sewer line).


The thought process includes weighing the lines of evidence against the relative hazard of the services known or suspected. In the end, the PIC and Local MP (or designee) must ask themselves if they are reasonably assured that the decision to grant a waiver is a safe one. Consultation with the SSC Experienced Person (EP) and others on the project team, as well as a member of the H&S Team, may assist the PIC and Local MP (or designee) in making the decision. In the end, the PIC and Local MP (or designee) are the only ones who may grant a waiver.

What follows is an illustration of the decision-making process, based on the situation presented in the Example Project.

Waiver Decision: Private Markouts

The Project Information Summary suggests that the team has two of four possible lines of evidence in hand (a site plan and public utility markouts). The Site Services Model suggests that while those lines of evidence have provided us with a good idea about the locations and status of some high-hazard services and the former process sewer, they have not provided any sufficient detail about the hydrogen pipeline, which is known to be active and suspected to be running through the work area. That is, we have zero lines of evidence concerning the route of the hydrogen pipeline.

The private utility markout is the only available option for obtaining a line of evidence on the hydrogen pipeline. While that provider is on site, they may also be utilized to verify the route of the process sewer (as a second line of evidence) and the status of the de-energized conductors (i.e., that they are indeed de-energized). Additional lines of evidence never hurt!

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The Private Utility Markout Waiver Decision

		Pieces of Information / Quality	
		Less	More
Relative Hazard of Striking the Service	Higher	No Waiver	Caution
	Lower	Caution	Waiver Possible

To continue the example, the PIC and Local MP were not reasonably assured that it would be safe to waive the Private Utility markout and thus decided not to grant the waiver.

For purposes of the example, assume that the private utility markout was used to:

- Verify the route of the process sewer (which was found to align well with available surface clues and the site plan),
- Confirm that the electrical conductors are indeed de-energized, and
- Identify the route of the hydrogen pipeline (which was found to be distant from the process sewer).


Waiver Decision: Allowing Ground Disturbance within a Critical Zone

In addition to being “reasonably assured” about the safety of advancing within a Critical Zone, the PIC and Local MP are also required to factor the following into their decisions:

- If possible, energized pipes or cables within the Critical Zone should be de-energized.
- Ground disturbance activities within the Critical Zone do not present an unacceptable safety, environmental, or operational risk, either on-site or off-site.

In this case, with the process sewer, there is no need to de-energize it (it is inactive). If the sewer were to be struck, however, there is certainly an environmental risk – but there is some question as to it being an “unacceptable” risk. For the time being, assume that the PIC, Local MP, and project team believe the risk to be “acceptable”.

Even though the first position, of course, is to not advance within the Critical Zone unless absolutely necessary, the technical objectives of the Example Project require that the team advance borings within the Critical Zone (i.e., close to the lines). Taking that into consideration, the PIC and Local MP review the Project Information Summary and the Site Services Model – both of which have evolved with the execution of the private locator service. The PIC, Local MP, SSC EP and project team ask, “Given what we know, are we reasonably assured that we will not strike the sewer line?”

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By virtue of the private utility markout, the team now has an additional line of evidence about the route of the former process sewer and a high degree of confidence in it. The process sewer is not energized and is on the lower end of the relative hazard scale.

The Critical Zone Waiver Decision

		Pieces of Information / Quality	
		Less	More
Relative Hazard of Striking the Service	Higher	No Waiver	Caution
	Lower	Caution	Waiver Possible

All things being equal, the PIC and Local MP are reasonably assured that advancing within the Critical Zone would be a safe decision, and will grant the waiver to allow the work inside the Critical Zone to proceed.

Waiver Decision: Point Disturbance Clearance

Recall that there is widespread subsurface debris at the site, mostly present in the 0-1 meter depth interval. Ground disturbance will occur inside a Critical Zone, which requires point disturbance clearance to the deeper of:


- 2 feet / 0.6 meters beyond the expected bottom depth of the service (in this case, up to 2.4 meters given the depth of the process sewer);
- 8 feet / 2.4 meters; or
- 2 feet / 0.6 meters below the frost line.

In this example, the required depth of clearance is 2 feet beyond the expected bottom depth of the sewer line. However, given the logistical and technical challenges of clearing the locations given the presence of debris, should the PIC and Local MP waive the requirement for point disturbance clearance?

The Point Disturbance Clearance Waiver Decision

		Pieces of Information / Quality	
		Less	More
Relative Hazard of Striking the Service	Higher	No Waiver	Caution
	Lower	Caution	Waiver Possible

There are multiple, good quality lines of evidence that confirm the routes of nearby services (as well as the absence of others), and the former process sewer ranks low in terms of relative hazard. In this case, the PIC is reasonably assured that waiving the point disturbance clearance requirement is a safe decision.

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Another Case to Consider

In the example above, circumstances led to fairly clear-cut decisions for granting waivers to the SSC Process. Considerations of the lines of evidence and relative hazard tended to the regions of “Waiver Possible” in the Waiver Matrix. Real world circumstances may lead to less clear-cut decisions and more ambiguity in being reasonably assured.

As an illustration, replace the former process sewer in the example above with an energized high voltage electrical cable. For the project, it is required to sample within 1 meter of the cable. Assume that the private utility markout was performed, and that the route of the cable determined from that work matches well with what is shown on the site plan. Should the PIC and Local MP allow advancing within the Critical Zone?

The High Voltage Cable Critical Zone Waiver Decision


		Pieces of Information / Quality	
		Less	More
Relative Hazard of Striking the Service	Higher	No Waiver	Caution
	Lower	Caution	Waiver Possible

There are several quality lines of evidence that provide the route and location of the high voltage cable. Striking the cable would indeed be very hazardous. The Waiver Matrix indicates approaching the waiver decision cautiously. Indeed, that is exactly what the PIC and Local MP should do.

If the cable can be de-energized to reduce the hazard, then a Waiver to advance inside the Critical Zone would certainly be a safer decision. But what if the local utility says that the cable cannot be de-energized? The project requires advancing borings inside a Critical Zone. Even though the team believes that they have a very good understanding of the location of the service, the potential magnitude of the hazard is high, and presents a level of risk that would likely be unacceptable. In this case, not allowing the disturbance within the Critical Zone (i.e., not granting the waiver) may be the best decision.

Additional considerations may be taken into account here. For example:


- Would it be possible (after discussion with the client and discussing the risks) to advance farther away from the service (i.e., is it really necessary to get within 1 meter of the service)?
- Have we confirmed that the selected point disturbance clearance method uses non-conductive equipment?
- Might another discussion with the utility be useful in terms of de-energizing the high voltage cable?
- Are there any additional safety precautions (e.g., grounding the drilling equipment) that might reduce the relative hazard?

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Final Notes


Some waiver decisions may affect other waiver decisions. For example, waiving the private utility markout eliminates a potential high-quality line of evidence. Not having this line of evidence will affect the ability to be reasonably assured that permitting work within a Critical Zone or waiving the point disturbance clearance is a safe decision. Additionally, not being able to conduct point disturbance clearance will affect the ability to be reasonably assured that working inside the Critical Zone is a safe decision. Each waiver that is granted reduces or removes a safeguard, and extreme caution must be exercised when granting multiple waivers on a single project site.

In the end, the PIC and Local MP should err on the side of caution when it comes to making any waiver decision. PICs and Local MPs must ultimately be “reasonably assured” that a waiver decision is a safe one for their project team, contractors and client.

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Appendix 5 – SSC Training Certification Requirements

SSC GE Certification Process		
Initial Training	Required Element:	How Completed:
	Initial SSC Training	2.5 Hour Event (Instructor-Led Session)
	Post-Work Quiz	Online Test
	Acknowledgement of Procedure Review	Online Material
Refresher Training	Required Element:	How Completed:
	Annual Refresher Class	1 Hour Event (Instructor-Led Session)
	Post-Work Quiz	Online Test
SSC EP Certification Process		
Initial Training	Required Element:	How Completed:
	Initial Training	2.5 Hour Event (Instructor-Led Session)
	Post-Work Quiz	Online Test
	Acknowledgement of Procedure Review	Online Material
	EP Competency Assessment	Online Test
	Documentation of Experience	Online Form – enter 5 to 10 projects
	SSC EP Approval Certificate	Standardized questionnaire completed by Local MP based on input from Line Manager of candidate, PICs the candidate has worked for, and EPs that have mentored the candidate. Upon receipt of completed and signed questionnaire, Academy Team will mark EP status as Certified.
Refresher Training	Required Element:	How Completed:
	Annual Refresher Class	1 Hour Event (Instructor-Led Session)
	Post-Work Quiz	Online Test
	Documentation of EP Assignment during previous 12 month period	Online Form – EP will need to document at least 1 field assignments over the previous 12 months where they served as EP and completed SSC Project Plan. This requirement can only be “exempted” under direction of Local MP via formal request to Academy.
	Documentation of Partner SSC Audit during previous 12 month period	Online Form – EP will need to verify that at least 1 SSC Audit was completed by a SSC certified Partner, TD, or H&S Team Member over previous 12 months on a project where they served as EP. This requirement can only be “exempted” under direction of Local MP.

	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1130-PR	6
	Title:	Contractor Management	Last Revision Date:	10/3/17

1. Purpose and Scope

This procedure describes:

- Contractor health, safety, security, and environmental (HSSE) performance expectations;
- The pre-evaluation process for approval of contractors, their safety programs, and their insurance documents;
- The evaluation of contractor safety performance while working for ERM; and
- The responsibilities of the ERM project team with respect to implementation of this program and oversight of contractor safety.

The procedure applies to all ERM work activities which are contracted to an outside firm, except those specifically excluded elsewhere in this document. This procedure does not apply to third party contractors which may be working on the same site as ERM, but do not have a contractual relationship with ERM.


2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure a contractor management program is implemented, understood, and followed by employees under their charge and working on their projects;
- Appoint a Project Manager/Supervisor who will manage all aspects of conformance with the procedure;
- Approve and execute contractor agreements for each contractor working on ERM projects/sites and may participate in negotiations, as necessary;
- Assess, in conjunction with the Project Manager/Supervisor, the performance of ERM contractors based on observations and assessments in the field;
- Correct, in conjunction with the Project Manager/Supervisor, any observed deficiencies in the performance of the ERM contractor; and
- Correct any deficiencies in the implementation of the program as identified by the Business Unit Health and Safety Director.

Project Manager/Supervisor: Responsible for the following elements:

- Perform observations of contractor work processes to assess whether or not the contractor is operating in accordance with applicable health and safety requirements;
- Verify contractors are approved to provide services to ERM as established by this procedure and ERM's Global Contractor Management Program ([ERM-1130-PR1](#));

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- Communicate ERM and client driven HSSE requirements to project contractors by providing the standard contractor agreement or a project- or client-specific contractor agreement during project planning or scoping;
- Understand and confirm the competency of ERM contractor staff who will be providing field project support;
- Request required documentation from contractors as defined in any project-specific agreements (i.e., Contractor Health and Safety Plans, Job Hazard Analyses (JHAs), work procedures, etc.);
- Interact with and mentor contractors during the working relationship;
- Evaluate best practices provided by contractor personnel for potential inclusion in project work planning;
- Stop work where deviations from accepted health and safety requirements are observed;
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the performance of the contractor;
- Work with the contractor to complete incident investigations and, where needed, root cause evaluations, for incidents and high-value near misses which occur on ERM job sites; and
- Contact ERM Legal in the event of serious or repeated breaches of health and safety requirements and assess whether action is warranted under the contract.

Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of these policies during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

ERM Staff: Responsible for the following elements:

- Attend and interact with contractors during safety meetings to ensure that the scope of work, risks and precautions are understood by all project participants;
- Raise any concerns of job performance with the project management and contractors as established in the project communications plan, including implementing stop work authority if there is an imminent risk of injury or property damage; and
- Utilize the Event Communication System (ECS) to report any incidents, near misses, unsafe acts and conditions and remarkable safe behaviors observed during work with contractors.

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3. Definitions

A contractor is defined as a person or company engaged by ERM for work or services billed to a project, or work or services for ERM in an ERM office. The term “contractor” may include contractors, subcontractors, consultants, sub-consultants, vendors, and suppliers.

Companies that provide a professional service to ERM such as accounting, legal or professional services, travel planning, taxis, etc., or who provide a supply service to ERM offices, such as non-operated equipment rental, coffee vending, food vending, water cooler vending, etc. are not considered contractors under this procedure.

4. Procedure

4.1 Contractor Prequalification and Selection


Contractors desiring to perform work for ERM shall be required to be pre-qualified in accordance with ERM’s Global Contractor Management Program. In the USA, Avetta, a third-party service provider, qualifies and maintains updated information about suppliers and contractors based on the requirements of its clients. Contractors will submit a variety of information to Avetta, including insurance limits, OSHA logs, safety and training programs, bonding capability, and diversity information. Potential contractors also have to agree to adhere to ERM’s policies, including our Anti-Bribery and Corruption (ABC) Policy and Business Conduct and Ethics Agreement, and Subsurface Clearance Program (as applicable).

Avetta shall evaluate the information provided by the proposed contractor and compares it to a detailed list of requirements provided by ERM. Information submitted by the contractor must be updated at least annually.

ERM's minimum safety criteria for US firms are as follows:

- No fatalities in the past five years;
- A Total Recordable Incidence Rate (TRIR) at or below the industry average for the past three years based on North American Industrial Classification System (NAICS) code;
- A Days Away/Restricted/Transfer (DART) rate at or below the industry average for the past three years based on NAICS code;
- An Experience Modification Rate (EMR) at or below 1.0 for the past three years; and
- No open or unresolved regulatory citations within the past three years.

Companies that service ERM offices such as coffee vendors, vending machine companies, water cooler vendors, etc. do not have to be qualified under this procedure. Additionally, retailers providing point-of-sale purchases (e.g., purchase of a tool from Home Depot) do not have to be qualified under this procedure.

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Further information on prequalification can be found on the Contractor Prequalification Health and Safety Prequalification Process section of the Americas Health and Safety page on Minerva.

4.2 Contractor Interactions/Expectations

The Project Manager/Supervisor must ensure that the contractor is provided with necessary information to work safely, including, but not limited to:

- ERM contact name and phone number;
- ERM health and safety requirements;
- Client health and safety requirements (including any drug and alcohol policies);
- Site-specific emergency action plans; and
- Safety information from other ERM contractors or third-party contractors at the site.

The Project Manager/Supervisor must ensure that contractor personnel participate in site-related safety meetings, including pre-job meetings, safety orientations, daily tailgate safety meetings, and any job-related safety inspections.


Contractors must conform to all regulatory and policy driven HSSE requirements. Contractors are contractually and legally responsible for providing personnel who are qualified to meet or exceed the expectations of ERM and customer work scopes. Contractor agreements are used to clearly define contractor accountabilities and responsibilities.

Contractors are expected to conform to their internal HSSE policies and requirements as well as those of ERM and ERM clients. Where conflicts exist between these policies and requirements, contractors must adhere to the most stringent policy and requirement. Where needed, the contractor should have the capability to develop additional safety procedures or hazard assessments for work that is performed exclusively by their employees and for which they may have superior knowledge.

Contractors will provide, upon request and at the time of proposing services, a description of their HSSE system, as well as resumes, training certificates, course rosters, and other documents confirming contractor employee qualifications and competencies. Since ERM employees do not operate equipment or machinery, contractors hired for that purpose must be able to adequately demonstrate that they are qualified to do so. ERM or our selected pre-qualification vendors may audit these systems and documentation for conformance with defined expectations. Contractors will be provided the opportunity to close any gaps identified during this evaluation and Project Managers/Supervisors will ensure gaps are closed before work begins.

4.3 Assessment of Contractor Performance

The Project Manager/Supervisor should regularly assess the contractor's operations to determine their level of compliance with applicable health and safety requirements. This should also

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include a review of required health and safety documentation. Assessment can be performed directly by the Project Manager/Supervisor or delegated to appropriate field staff.

Where ERM personnel observe safety events (i.e., incidents, near misses, unsafe acts/conditions) related to contractor operations, they should bring the events to the attention of ERM's Project Manager/Supervisor as well as the contractor management team for immediate resolution. Events should also be posted in ERM's Event Communication System (ECS). Staff shall take the opportunity to also note remarkable safe behaviors to leverage positive activities for continuous improvement in projects.

The Project Manager/Supervisor will evaluate the contractor's performance following completion of the contracted work activities. If a contractor's performance is such that the PIC or the Project Manager/Supervisor feels that they should be barred from further use by ERM, a formal variance should be sent to the Business Unit Managing Partner (BUMP) providing the reasons for the request. The BUMP will make a decision regarding the contractor after consultation with appropriate ERM team members and can decide to change the contractor's approval flag status in Avetta.

5. References

- Avetta Global Supply Chain Management Solutions (www.avetta.com)
- ERM Procedure [ERM-1130-PR1](#) (*Contractor Management*)

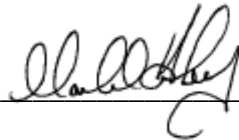
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Document Control Information

Original Effective Date: 8/1/14


Policy Approval by: Mark Hickey

Approval Signature: _____



Revision History

Section	Reason for Revision	Date
All	New document	3/6/14
All	Revised format to meet new Global SMS requirements	7/3/14
All	Changed “subcontractor” to “contractor” throughout; addressed comments of Regional H&S Director	8/1/14
4.2	Updated to include transmission of client’s drug and alcohol policies	5/19/15
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/9/17
4.2	Updated to denote qualification of contractors to operate equipment and machinery.	10/3/17

	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1213-PR1	3
	Title:	Fire Prevention	Last Revision Date:	1/17/18

1. Purpose and Scope

This procedure provides information on reducing/eliminating fire hazards in the workplace and provides for rapid effective response in the event a fire occurs. This procedure is applicable to all North American operations.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director or other staff member.

Project Manager: Responsible for the following elements:

- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.


3. Definitions

- **UL:** A worldwide safety consulting and certification company providing safety-related certification, validation, testing, inspection, auditing, advising, and training services. Formerly known as Underwriters Laboratories.

4. Procedure

4.1 Action Plans

ERM requires the development of appropriate action plans to address the potential for fire hazards and response. In office settings, ERM requires the development of an Emergency

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Action Plan (EAP; [NAM-1212-PR1](#)), which addresses fire-related issues in an office or warehouse setting. For field projects, ERM requires the development of a site-specific health and safety plan (HASP; [NAM-1110-PR1](#)), which addresses emergency issues on the site including fire concerns.

4.2 Housekeeping

ERM shall ensure that good housekeeping is maintained in work areas to reduce the potential for fire hazards. All identified fire hazards shall be removed immediately.

Good housekeeping will also assist in providing safe routes of egress if a fire occurs. Regular visual evaluations of housekeeping shall ensure that:

- Accumulations of combustibles (including paper and cardboard) are removed;
- Flammable and combustible materials, if present, are stored in accordance with applicable regulations (see [NAM-1213-FM1](#) for additional information); and
- Sources of ignition are controlled or removed, including open flames, sparks, wiring issues, and smoking.


4.3 Extinguisher Placement

An appropriate number and type of extinguishers will be maintained for the operations being performed at the office or field site. Only UL listed extinguishers will be used. Guideline document [NAM-1213-GU1](#) provides additional information on fire classifications. Guideline document [NAM-1213-GU2](#) provides additional information on extinguisher placement. Note that placement of extinguishers may also be dependent on local regulations; evaluation of these regulations will be performed by ERM's facilities team in conjunction with local building owners.

4.4 Inspection

Fire extinguishers under the control of ERM will be inspected monthly. Inspections shall be documented. At a minimum, inspections will check:

- Proper mounting of the extinguisher;
- Access to the extinguisher is not obstructed;
- Pins are in place;
- Charge indicator is in the "green" range; and
- No indication of physical damage to the extinguisher.

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In addition, all extinguishers under the control of ERM will be inspected annually by a qualified fire services contractor. Extinguishers that are beyond their annual service date or that have been discharged shall be tagged, removed from service, and replaced.

4.5 Training


Employees who may be expected to use fire extinguishers as an emergency response tool shall be trained in the following areas:

- Fire hazard recognition;
- Fire hazard prevention; and
- Fire extinguisher use.

Training shall be provided before initial assignment to a site where extinguisher use may be necessary and at least annually thereafter.

5. References

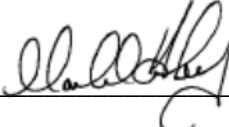
- ERM Guidance Document [NAM-1213-GU1](#) (*Fire Classifications*)
- ERM Guidance Document [NAM-1213-GU2](#) (*Fire Extinguisher Requirements*)
- ERM Form [NAM-1213-FM1](#) (*Flammable and Combustible Checklist*)
- ERM Procedure [NAM-1212-PR1](#) (*Emergency Action Plan*)
- ERM Procedure [NAM-1110-PR1](#) (*Project Health and Safety*)

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Document Control Information


Original Effective Date: 9/7/16

Policy Approval by: Mark Hickey

Approval Signature:  _____

Revision History

Section	Reason for Revision	Date
All	New document.	9/7/16
All	Updated document numbers throughout; updated titles in Section 2	1/4/17
4, 5	Added reference on flammable/combustible materials; updated references	1/17/18

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	North America		NAM-1220-PR1	8
	Title:	Incident Reporting and Investigation	Last Revision Date:	6/26/18

1. Purpose and Scope

This document supports the requirements to ensure that safety events are being properly reported and investigated within ERM operations. This document applies to all ERM North America field and office locations.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensuring this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correcting any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director.

Project Manager (PM)/Supervisor/Area Manager: Responsible for the following elements:

- Performing observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure; and
- Correcting, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Business Unit Health and Safety Director: Responsible for the following elements:


- Evaluating implementation of this procedure by personnel during Event Communication System (ECS) reviews; and
- Communicating identified deficiencies to the PIC and Business Unit management teams.

Regional Health and Safety Director: Responsible for the following elements:

- Notifying the Occupational Safety and Health Administration (OSHA) of an employee fatality, hospitalization, amputation, or loss of an eye; and
- Determining, in conjunction with the Global Health and Safety Director, the recordability of incidents.

Employee: Responsible for the following elements:

- Completing ECS entries within 24 hours of a safety event; and
- Participating in the investigation of the event as directed by the ERM management and health and safety (H&S) teams.

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3. Definitions

Event Communication System (ECS): The primary tool utilized at ERM for communicating the occurrence of safety events.

Event Principals: People who may be involved in safety events, including ERM employees, subcontractors, and third parties (including clients).

5 Why: A question-asking technique used to explore the cause and effect relationship underlying a problem or event.

Incident: One of the following:

- An employee becomes injured or is made ill;
- Useful property is damaged in some fashion;
- A hazardous material is spilled or released to air, water, or ground;
- Operational security is breached;
- A regulatory citation is issued; or
- A loss of reputation to clients or the general public is sustained.

Near Miss: An unplanned event that did not result in an incident, but had the potential to do so.

Reporting Person: The ERM employee entering the Safety Event into the ECS.

Root Cause Analysis: A method of problem solving that tries to identify the root causes of an issue. A root cause is one that, once removed, would have prevented the final undesirable event from occurring.

Safe Behavior: A positive action or attitude toward safety or that promoted safety within the workplace.


Safety Event: An incident, near miss, unsafe act/condition, or safe behavior occurring within or due to the working environment experienced by ERM personnel.

Unsafe Act: A task or activity conducted in a manner that may threaten the health and safety of co-workers.

Unsafe Condition: A condition in the work environment likely to lead an incident if not corrected.

Workcare: The occupational health consulting firm which assists ERM in management of its medical surveillance programs.

Working Environment: Anywhere ERM, its employees, and its subcontractors are engaged in work activity, including ERM offices, client sites (visits, meetings, field work, etc.), or during travel.

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4. Procedure

4.1 Safety Event Initial Response


4.1.1 Injuries or Illnesses

The general steps for responding to an injury or illness incident include the following:

- For emergency situations, employees shall call 911. This would include chest pains, stroke, severe shortness of breath, sudden and severe pain, major injury (including potential fractures and trauma), uncontrolled bleeding, electrocution, second or third degree burns, or unconsciousness. If transport to an urgent care center or hospital is required, a second ERM employee must accompany or follow the injured or ill employee to the medical treatment center. Refer to ERM Procedure [NAM-1210-PR1](#) (*Injury/Illness Management*) for additional information.
- For non-emergency situations, employees shall give necessary first aid care for the employee (if qualified to do so) and secure the scene.
- After stabilizing the scene and ensuring appropriate initial treatment is provided to the employee, contact the PM/Supervisor, who will then contact the PIC and/or the Area Manager, as well as the local and/or Business Unit H&S team, to report the event. Verbal communication requirements are provided in ERM Work Instruction [NAM-1220-WI3](#) (*Verbal Communication Matrix*). ERM will also contact the client as soon as possible, but no later than 24 hours after the event.
- Immediately after contacting the ERM management and H&S personnel, an ERM representative shall call ERM's medical service provider (Workcare) to initiate the Incident Intervention process if follow-up medical treatment is deemed necessary by the management or health and safety team. The phone number is 888-449-7787.
- Within 24 hour, ERM employees shall enter the basic details of the event into the ECS.

Note that the above direction may change based on site-specific circumstances or client-specific requirements. Emergency response elements, including contact information and directions to urgent care facilities, will be included in the project health and safety plan (HASP) as well as the Emergency Action Plan (EAP) within each office.

In the event of a fatality or if an ERM employee suffers a work-related hospitalization, amputation, or loss of an eye, ERM's management team with the assistance of the Regional Health and Safety Director is responsible for notifying the Occupational Safety and Health Administration (OSHA). Notification must be made within eight hours of a fatality and within 24 hours of all other reportable events. *Note that these notification requirements only pertain to incidents occurring within the United States.*

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4.1.2 Non-injury Incidents and Near Misses

After the occurrence of a work related non-injury incident (property damage, environmental release, etc.), work will be halted, the scene will be secured, and initial facts gathered regarding the event. Work should not continue until the causes of the incident or near miss are understood and corrected. Within 24 hours, ERM employees must enter the basic details of the event into the ECS. ERM will contact the client as soon as possible, but no later than 24 hours after the event.

4.1.3 Unsafe Acts and Conditions/Safe Behaviors

When a work related unsafe act or condition is identified, work will be halted until the act or condition is addressed and corrected. Similarly, when safe behaviors are identified, the employee(s) involved should be commended for their safe performance. Within 24 hours of the observation, ERM employees must enter the basic details of these events into the ECS.


4.2 Safety Event Follow-up

4.2.1 ECS Information/Routing

All safety events, including injuries/illnesses (including first aid cases), near misses, unsafe acts, and unsafe conditions, will be documented in ECS. An investigation into the safety event will be conducted, which will include at a minimum:

- The time, date, and location of the event;
- The type of event;
- The nature and the exact location of the injuries to the injured party;
- The persons involved in the event, including injured personnel and witnesses;
- A brief description of the event;
- Immediate actions taken in response to the event including the nature of first aid treatment given (if applicable);
- Information to support the investigation and response, including additional details, photographs, documents, timelines, etc.;
- An evaluation of causal factors affecting the event;
- Corrective actions to prevent similar occurrences; and
- The names of the investigators and reviewers.

After the basic details of a safety event are entered into the ECS by the employee or designated reporting person, the system will automatically notify appropriate parties. All individuals receiving automatic notification are included on the communication chain for the safety event's

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ECS record. Automatic notifications per Event Type are summarized in ERM Work Instruction [NAM-1220-WI1](#) (*ECS Email Notification Matrix*). Note that any ERM employee may be added to the communication chain for an ECS record as an additional affected party.

4.2.2 Initiating and Conducting Follow-up

ERM assigns and tracks corrective actions for all safety events. The required detail of the follow-up and the personnel involved is based on the Event Type and its actual or potential severity, as judged by the project and/or safety team. The ECS record created by entering the Safety Event is meant to both guide follow-up and document the findings of the investigation.

At the option of ERM's H&S and/or management team, or as required by actual or potential severity of the event, a more robust follow-up may be required, including root cause analysis.

Within 24 hours of the initial communication of the Safety Event into ECS, a member of the BU safety team will contact the Reporting Person to gather initial facts and begin the investigation. The safety team will be responsible for:

- Stewarding the completion of the investigation with the persons involved in the Safety Event; and
- Verifying that all assigned corrective actions have been completed.


4.2.3 Determining Recordability

If the Safety Event is an occupational illness or injury, then the Regional Health and Safety Director will confer with ERM's Global Health and Safety Director to determine recordability of the Safety Event. This will include a calculation of lost work days and/or restricted duty/job transfer time. These determinations will be made based on the established facts of the Safety Event and according to US recordkeeping criteria established by the OSHA.

Collected data on events meeting OSHA's recordability definition will be summarized on OSHA Forms 300 (*Log of Work-Related Injuries and Illnesses*) within seven days of the event and will be maintained as required by OSHA recordkeeping and reporting requirements. At the end of the calendar year, the OSHA Form 300A (*Summary of Work-Related Injuries and Illnesses*) will be reviewed and signed by a company official (e.g., Regional H&S Director). The completed and signed 300A form will be forwarded to all offices for posting in a conspicuous location visible to all employees between the dates of February 1 and April 30. Completed OSHA forms will be maintained in a central location for a minimum of five years.

4.2.4 Root Cause Analysis

A root cause analysis (RCA) will be performed for all recordable incidents and high value learning events as determined by the client, ERM management and/or the Regional Health and Safety Director. See [NAM-1221-FM1](#) (*Root Cause Analysis Worksheet*) for guidance.

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The RCA process should begin as soon as possible after the incident has been reported, all immediate response measures have been taken, and the situation is under control. If possible (given geographical location, site conditions, logistical planning, weather, travel restrictions, etc.), the draft RCA shall be completed within 48 hours of the event, but no later than 10 working days after the event. A final RCA report will be issued within 15 working days.

The default ERM RCA methodology in the “5 Why” technique, but ERM reserves the right to substitute other valid methods as deemed appropriate by management or the Regional Health and Safety Director. All team members associated with the investigation will be trained in the application of their responsibilities and the chosen incident investigation technique.

The first step in the process is to assemble the RCA team. The team shall be led by the PIC and facilitated by a member of the ERM H&S team or another ERM employee trained in RCA methods. Other team members may include:


- The PM of the project;
- The Area Manager (if the Safety Event was based in the office);
- The person directly involved in the event;
- Other employees familiar with the activities during which the event occurred;
- Subcontractor representatives (if a subcontractor was involved); and
- A senior ERM Partner not involved in the event (e.g., Practice Leader or BU Managing Partner).

The RCA team leader will ensure that any equipment necessary to complete the investigation is assembled. This may include, but not be limited to, writing equipment, measurement equipment, cameras or other recording devices, marking devices, equipment manuals, and personal protective equipment (PPE).

The RCA team leader will facilitate the implementation of the process, which may include:

- Interviews and fact gathering;
- Casual factor determination;
- Root cause identification using the “5 Why” method; and
- Corrective action recommendation.

The final RCA report will be uploaded to the ECS record after the event. Adopted corrective actions will be tracked to completion in the ECS. All corrective actions must be completed within 30 days of the issuance of the RCA report. If additional time is needed to complete a corrective action, the Regional Health and Safety Director must be notified.

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4.2.5 Approval and Record Finalization

When the corrective actions are verified as complete, the following individuals will indicate their approval of the event:


- For incidents, the applicable Business Unit Health and Safety Director, the Business Unit Managing Partner (MP), and the Regional Health and Safety Director.
- For all other safety events, the Business Unit Health and Safety Director.

After all approvals are made, the Business Unit Health and Safety Director will initiate the finalization check within ECS to save and close the record. Future changes are locked out after event finalization.

4.3 Additional Procedures for Mine-Related Safety Events

For ERM projects covered by the regulatory statutes of the Mine Safety and Health Administration (MSHA), additional recordkeeping is required when specific safety events occur. Safety events meeting one or more of the following criteria must be reported to both the mine operator and MSHA immediately (i.e., no later than 15 minutes after occurrence):

- Death of an ERM employee;
- Injury to an ERM employee at the mine that had the reasonable potential to cause death;
- Entrapment of an ERM employee for more than 30 minutes or which had the reasonable potential to cause death;
- An unplanned inundation of a mine by liquid or gas;
- An unplanned ignition or explosion of gas or dust;
- In underground mines, an unplanned fire not extinguished within 10 minutes of discovery;
- In surface mines, an unplanned fire not extinguished within 30 minutes of discovery;
- An unplanned ignition or explosion of a blasting agent or explosive;
- An unplanned roof fall at or above the anchorage zone in active workings that impair ventilation or impede passage;
- A coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour;
- An unstable condition at an impoundment, refusal pile, or culm bank which requires emergency action to prevent failure, or which cause individuals to evacuate an area, or failure of an impoundment, refuse pile, or culm bank;
- Damage to hoisting equipment in a shaft or slope which endangers an individual or which interferes with use of the equipment for more than 30 minutes, and


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- An event at a mine which causes death or bodily injury to an ERM employee not at the mine when the event occurs.

Within 10 days of occurrence, ERM must submit a report of any work-related incidents to MSHA using MSHA Form 7000-1. Additionally, each calendar quarter, ERM must submit employment information to MSHA utilizing MSHA Form 7000-2. The form must be completed and submitted to MSHA no later than 15 days after the end of each calendar quarter.

5. References

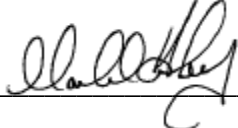
- Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1904 (*Recording and Reporting Occupational Injuries and Illnesses*)
- Mine Safety and Health Administration (MSHA) 30 CFR 50 (*Notification, Investigation, Reports, and Records of Accidents, Injuries, Illnesses, Employment, and Coal Production in Mines*)
- ERM Form [NAM-1221-FM1](#) (*Root Cause Analysis Worksheet*)
- ERM Work Instruction [NAM-1220-WI1](#) (*ECS E-mail Notification Matrix*)
- ERM Work Instruction [NAM-1220-WI2](#) (*Event Severity Matrix*)
- ERM Work Instruction [NAM-1220-WI3](#) (*Verbal Communication Matrix*)
- ERM Procedure [NAM-1220-PR1](#) (*Injury/Illness Management*)

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Original Effective Date: 10/17/14

Policy Approval by: Mark Hickey

Approval Signature:  _____

Revision History

Section	Reason for Revision	Date
All	Revised and edited to meet new Global SMS requirements and update procedures	10/17/14
Intro; 5	Updated Applicability; added references to Section 5	1/11/16
4.2.1	Added information on data collected in ECS reports	7/14/16
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/10/17
4.1.1; 4.1.2	Added information on client notification	2/7/17
4.2.3	Added information on OSHA log requirements	2/12/17
4.2.4	Revised language around timing of RCA development and closure	4/19/18
4.2.1	Minor revision in information collected during investigation	6/26/18

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	North America		NAM-1301-PR1	7
	Title:	Hazard Communication/Workplace Hazardous Materials Information System	Last Revision Date:	2/15/19

1. Purpose and Scope

This procedure is designed to ensure that information necessary for the safe use, handling, and storage of hazardous products is provided and made available to all ERM employees. This document applies to all ERM employees who work with or near hazardous products, and covers all ERM work activities. The procedure is designed to meet the regulatory requirements of the US's Hazard Communication standard as well as Canada's Workplace Hazardous Materials Information System 2015 (WHMIS), each of which incorporates the Globally Harmonized System for Classification and Labelling of Chemicals (GHS).

2. Roles and Responsibilities

Regional Health and Safety Director: Responsible for ensuring that a written hazard communication program is prepared, implemented, and regularly evaluated for applicability.

Partner in Charge (PIC): Responsible for the following elements:


- Ensure this program is implemented, understood, and followed by employees under their charge and working on their projects;
- Ensure, in conjunction with the Area Manager/Project Manager, that employees are properly trained in accordance with this procedure;
- Ensure that any site-specific health and safety plans (HASP) address hazard communication elements as described herein; and
- Correct any deficiencies in the implementation of this program as identified by the Business Unit Health and Safety Director.

Area Manager/Project Manager: Responsible for the following elements:

- Maintain a master inventory of all chemicals brought to and/or used in the workplace;
- Ensure that current Safety Data Sheets (SDS) for each chemical on the inventory are readily available to all employees;
- Ensure that all chemical containers are properly labeled upon receipt at the workplace and that labels are not defaced or moved from the container until it is empty;
- Ensure that each ERM employee and affected ERM contractors are familiar with the chemicals present in the work area and their associated hazards; and
- Ensure that, when working on client sites, the client informs the project team of the location of applicable SDS or provides a copy of applicable SDS.

Business Unit Health and Safety Director: Responsible for the following elements:

- Monitor new employees for completion of appropriate training;

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- Assist PICs, Area Managers, and Project Managers in the implementation of this program, as needed, and
- Evaluate compliance with this program during office and project audits.

Employee: Responsible for the following elements:

- Complete all ERM-required initial and update training;
- Follow all hazard control information provided on SDS and chemical labels; and
- Notify their Area Manager/Project Manager if unlabeled chemicals are observed in the workplace.

3. Definitions

- Globally Harmonized System (GHS) – A system for standardizing and harmonizing the classification and labelling of chemicals
- Hazardous Materials Identification System (HMIS) – A numerical hazard rating that incorporates colors to convey broad health warning information for chemical users.
- National Fire Protection Association (NFPA) Diamond – A labeling system used by emergency response personnel to quickly and easily define the risks associated with hazardous materials.
- Safety Data Sheet (SDS) – A document that contains information on the potential hazards of, and how to work safely with, a chemical product.


4. Procedure

4.1 Labeling

Supplier labels must be affixed to all containers of chemicals, whether used, handled, or stored in the field or on ERM property, and will minimally provide the following information:

- A product or chemical identifier;
- Appropriate hazard warnings (i.e., words, statements, pictures, and/or symbols) which provide general information regarding chemical hazards; and
- The identification of the manufacturer, distributor, or supplier of the chemical.

No person shall remove, deface or alter the supplier label as long as any amount of hazardous product remains in the container, unless the container is immediately marked with equivalent information via an alternate labeling format. If a supplier label is missing or illegible, it must be replaced with a workplace label providing equivalent information.

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A container is defined as a bag, barrel, bottle, box, can, cylinder, drum, pail, vessel, or storage tank containing a hazardous chemical. Pipes or piping systems, as well as engines, fuel tanks, and other operating systems in a vehicle, are not considered to be containers.

Portable containers into which chemicals are transferred from labeled containers must themselves have an equivalent label except in the following circumstances:

- The portable container is filled directly from a container with a supplier or workplace label affixed to it;
- The person who transferred the chemical into the portable container is the only person who will use the chemical;
- The content of the container is clearly identified; and
- All of the chemical in the portable container will be used completely by the end of the work shift.

Labels will be legible, in English, and prominently displayed at all times. In addition to English, labels may be presented in other languages. However, if a label is in only one language, that language shall be English. If non-English speaking employees are present in the work area, all labels will be available and presented in their language as well as English.

Sites which utilize chemicals governed by this procedure will periodically audit chemical containers to ensure that labels are present, intact, and legible. Examples of labeling formats, such as the GHS, HMIS, and NFPA systems, are provided in [NAM-1301-WI1](#) (*Examples of Common Labeling Systems*).


4.2 Chemical Inventory

A chemical inventory must be maintained at any office or project site where chemicals are in use. The inventory must be updated and revised as chemicals are received or depleted. The name/identifier of the chemical as it appears on the chemical inventory must allow employees to be able to match the chemical with the SDS.

The chemical inventory for field projects will be incorporated into the project-specific HASP. The chemical inventory for office locations will be incorporated into the office-specific Emergency Action Plan (EAP).

4.3 Safety Data Sheets

The SDS provides written information on the chemicals of concern to the employees. The minimum data which must appear on an SDS is provided in [NAM-1301-WI2](#) (*Safety Data Sheet Composition*). An SDS must be obtained for any hazardous product used, handled or stored in an ERM workplace.

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For field projects, Project Managers will determine during HASP development if ERM employees will use chemicals during execution of the project. During this development and review period, the Project Manager will evaluate any new products which are proposed to be used at the site to determine if they contain extremely hazardous or carcinogenic chemicals. If so, the Project Manager will work with the Business Unit Health and Safety Director to identify potential alternatives. Any new chemical products which will be introduced throughout the course of the job will be similarly evaluated. The SDS for any chemical used on a project site will be attached to the HASP and will be readily available at the site.

For offices, Area Managers will evaluate any new products which are proposed to be used at the office to determine if they contain extremely hazardous or carcinogenic chemicals. If so, the Area Manager will work with the Business Unit Health and Safety Director to identify potential alternatives. The SDS for any chemical used in the office will be attached to the EAP and will be readily available at the site.


SDS shall be readily available to any ERM employee, employee representative, health and safety team member, contractor, or client. Upon receipt of an SDS, the Project Manager/Area Manager shall review the SDS to ensure it is written in English, is legible, appears to be complete (in accordance with the requirements outlined in [NAM-1301-WI2](#)), and is current, with an effective date of less than five years. If non-English speaking employees are present in the work area, all labels will be available and presented in their language as well as English. Older SDS will be replaced with updated sheets when they are received.

4.4 Contractors

The Project Manager will provide the following information to contractors prior to the start of any work at a client's site:

- Chemicals to which they may be exposed, including any soil or groundwater contaminants;
- Hazards associated with specific chemicals;
- Measures taken to reduce the hazard, including use of personal protective equipment (PPE);
- Location of the SDS;
- Locations of any applicable safety equipment, including first aid supplies, safety showers, and/or eye wash stations; and
- Emergency response procedures.

Prior to starting work, the contractor will provide the Project Manager with information about any chemicals brought onto the client's site. This information should include, at a minimum, the name of the chemical, the associated hazards, and any PPE required. Contractors will have a legible SDS for each chemical brought onto the project site.

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4.5 Employee Training and Information

Training of all employees potentially exposed to hazardous materials on the job will be conducted as follows:


- Before new employees begin their jobs; and
- Whenever new chemicals are introduced into the workplace.

This training will include:

- Applicable regulatory requirements (including state or province-specific requirements, where applicable);
- Elements of this program;
- Location of the program, chemical inventory, and SDS in the workplace;
- Chemicals used in their work areas and the associated hazards (chemical, physical, and health);
- How to detect the presence or release of chemicals, including monitoring techniques, visual indicators, or odors;
- Protective measures to be used, including safe use, storage, handling, and disposal practices (including those for products contained in piping systems, tanks, vessels, or conveyance systems, as applicable), use of PPE, and emergency response procedures;
- How to read and use SDS, including the purpose and significance of information contained therein;
- How to read and use supplier and workplace labels, including the purpose and significance of the information on the label;
- Procedures to be followed if fugitive emissions are present in the work area;
- Procedures to be followed in the event of an emergency involving workplace chemicals; and
- How to obtain additional hazard information.

Where non-English speaking workers are employed, provisions for training in the appropriate language will be arranged.

All initial training will be documented electronically via ERM's Academy Learning Management System (LMS). Documentation will include a brief description of the training and the trainer's name, and will be retained throughout the duration of the employee's tenure with the organization. Information on project-specific chemical hazards, labeling requirements, site-specific issues, and emergency response conditions will be documented as part of daily safety meetings at the project site using [NAM-1501-FM5](#) (*Site Safety Meeting Form*).

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4.6 Non-Routine Tasks


Occasionally, ERM employees may be required to perform non-routine field tasks which include exposure to hazardous chemicals. Prior to any non-routine work involving hazardous chemicals, the Project Manager will ensure that each affected employee is given information about the hazards presented by the chemicals, as well as the protective measures which will be utilized during the work.

4.7 Procedure Availability

The most recent version of the procedure will be available electronically at all times to employees and their designated representatives through ERM's Document Control System (DCS).

5. References

- ERM Form [NAM-1301-FM1](#) (*Chemical Inventory Sheet*)
- ERM Work Instruction [NAM-1301-WI1](#) (*Examples of Common Labeling Systems*)
- ERM Procedure [NAM-1110-PR1](#) (*Project Health and Safety*)
- ERM Procedure [NAM-1212-PR1](#) (*Emergency Action Plans*)
- US Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.1200 (*Hazard Communication*)
- Health Canada Workplace Hazardous Materials Information System (WHMIS) 2015
- Ontario Occupational Health and Safety Act (OHSA) Regulation 860 (*WHMIS*)

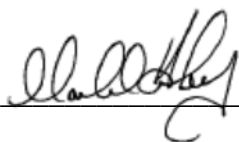
	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1301-PR1	7
	Title:	Hazard Communication/Workplace Hazardous Materials Information System	Last Revision Date:	2/15/19

Document Control Information

Original Effective Date: 1/29/15


Policy Approval by: Mark Hickey

Approval Signature: _____



Revision History

Section	Reason for Revision	Date
All	Changed format; updated to meet state and federal regulations	6/2/15
4.1	Require all portable containers to have equivalent labels except where noted	8/18/16
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References	1/16/17
All	Updated titles and procedures to address WHMIS requirements	1/23/18
1, 4, 5	Revised Purpose statement (Section 1); minor changes to labeling and training requirements (Section 4); added reference to US and Canada regulations	6/26/18
4.1	Added additional information regarding replacement of label information	2/15/19

	Applicability:		Guideline	Document Number:	Version:
	North America			NAM-1302-GU1	2
	Title:	Calibration and Testing of Direct-Reading Portable Air Monitors			Last Revision Date:

1. Purpose and Scope

This document provides information on the calibrating and testing of direct-reading portable monitors. These instruments are designed to alert employees to the presence of toxic gases, vapors, and particulates; oxygen-deficient atmospheres; and combustible atmospheres. Examples may include photoionization detectors (PIDs), single gas monitors, multi-gas meters, particulate/handheld aerosol monitors, etc. Inaccuracies in the instrument due to improper maintenance and calibration can lead to hazardous atmospheric conditions which may cause serious injuries, illnesses, or death.

2. Definitions

Calibration: A test measuring an instrument's accuracy relative to a known traceable standard.

Bump test: Qualitative check in which a challenge agent is passed over an instrument's sensors at a concentration and exposure time sufficient to active all alarm settings. The purpose of the bump test is to confirm that the test gas can get to the sensor(s) and that the instrument's alarms are functional. The bump test does not provide a measure of the instrument's accuracy.

Response Time: The amount of elapsed time between the exposure of an instrument to the atmosphere and the corresponding display of the final observed value based on conditions at the time of measurement.


Zeroing: A procedure which resets the instrument's reference points. Depending on the instrument, this may require either introduction of a zero air gas (gas containing no or minimal traces of the gas or vapor the instrument is designed to detect) or installation of a zero air filter (a filter designed to remove all particulate from the measured atmosphere).

3. Calibration Procedures

There are two methods for verifying the accuracy of a direct read instrument – a calibration check and a full calibration. Each of these methods is appropriate in certain situations.

The employee should begin by zeroing the instrument. The process of zeroing should be described in the instrument manufacturer's calibration instructions. This helps to ensure that the calibration is accurate.

A calibration check verifies that the sensor(s) and alarms respond within the manufacturer's acceptable limits by exposing the instrument to a test gas. The employee conducting the calibration check compares the instrument reading to the concentrations indicated on the test gas cylinder. If the instrument's response is within the acceptable range of the test gas concentration, then the calibration check has verified the instrument's accuracy. The acceptable range is typically $\pm 10\text{-}20\%$ of the test-gas concentration; however, this range is set by the instrument manufacturer and the manufacturer's guidelines should be reviewed prior to the calibration check.

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If the calibration check results are not within the acceptable range, the employee should perform a full calibration. A full calibration adjusts the instrument's reading to coincide with a known concentration (i.e., certified standard) of test gas.

In all cases, employees performing instrument calibration must follow the manufacturer's guidelines for the specific instrument involved. This would include using the type and concentration of test gas, flow regulators, flow tubing, and calibration adapters (if needed) mandated by the manufacturer. It would also include allowing for the appropriate response time for the instrument to reach the values anticipated by the calibration gas.


Note that certain instruments cannot be field calibrated (e.g., handheld aerosol monitors). Follow manufacturer's guidelines for setting up these instruments for field use and performing factory calibrations at required frequencies.

4. Bump Tests

At a minimum, bump tests should be conducted each day prior to use of a calibrated instrument. The bump test may be replaced with a calibration check where warranted. If an instrument fails a bump test, a full calibration should be performed.

5. Additional Information

- Sensor responsiveness may vary with workplace environmental conditions, such as temperature and humidity. Where possible, operators should calibrate sensors in environmental conditions that are similar to the actual workplace conditions. Follow the manufacturer's guidelines for proper calibration.
- Test gas used for calibration gas should always be certified using a standard traceable to the National Institute of Standards and Technology (NIST). The provider of the test gas should be able to provide a certificate of analysis for every cylinder of test gas.
- Calibration test gases may remain stable for only a limited amount of time. Look for an expiration date on any test gas used. Never use a test gas after its expiration date.
- Instruments may experience calibration drift as the sensors age. This means that the sensor can still detect the calibration gas, but may not be able to do so accurately. This problem can be exacerbated by exposure to extreme environmental conditions, elevated concentrations of airborne contaminants, or heavy shock or vibration. It can also occur through harsh storage or operating conditions or gradual degradation of internal components. Frequently, this condition will cause failure messages to appear or will limit the ability of the employee to accurately adjust the sensor readings. If at any time the employee suspects the instrument is experiencing calibration drift, it should be returned for service by qualified personnel.

	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1310-PR1	5
	Title:	Personal Protective Equipment	Last Revision Date:	2/15/19

1. Purpose and Scope

This document establishes safe work procedures to be used by ERM to minimize injury resulting from various occupational hazards through the use of personal protective equipment (PPE). Other types of hazard mitigation – including elimination, substitution, engineering controls, and administrative controls – are the best methods of hazard mitigation; however, in many cases the nature of consulting requires the use of PPE to supplement or replace those methods.

This procedure is applicable to all ERM operations. Note that respiratory protection ([NAM-1311-PR1](#)) and hearing protection ([NAM-1312-PR1](#)) are covered in other procedures.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this program is implemented, understood, and followed by employees under their charge; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director.

Project Manager/Supervisor: Responsible for the following elements:

- Implement program during any project activities where the use of PPE is determined to be necessary;
- Perform observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.


Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of PPE during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

Employee: Responsible for complying with the requirements stated within the procedure.

3. Definitions

None.

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	North America		NAM-1310-PR1	5
	Title:	Personal Protective Equipment	Last Revision Date:	2/15/19

4. Procedure

4.1 Hazard Assessments

The project management team shall complete a workplace hazard assessment identifying the PPE requirements for the project. The PPE requirements for any work task will be addressed in the appropriate planning document, including health and safety plans (HASP) and job hazard analyses (JHA). Hazard assessments are performed by considering multiple basic types of hazards which may be able to the work scope. These include, but may not be limited to, impacts, heat or cold, penetration, dusts, compression, radiation, chemical hazards, and electrical hazards.

Site-specific HASPs will include information outlining the actual PPE requirements for the project, including those required by client-specific mandate. All project team members will be briefed on the elements of the site-specific HASP prior to participating in field activities. This briefing will include information on what PPE is required for the various project tasks.

A completed JHA addresses both the hazards specific to a job task and the appropriate controls, which may include PPE. All project team members are required to review the JHA prior to commencement of task-specific activities and use the indicated PPE. The JHA will identify the person(s) performing and certifying the workplace hazard assessment and the dates the hazard assessment was completed.


4.2 PPE Selection

Once hazards have been identified and evaluated through the hazard assessment process, the process of selecting PPE includes:

- Becoming familiar with the potential hazards and the types of PPE available to mitigate those hazards;
- Comparing available PPE to hazards associated with the project site;
- Selecting PPE meeting any applicable regulatory and client requirements that ensures a level of protection greater than the minimum required to protect employees; and
- Fitting the employees with proper, comfortable, and well-fitting PPE and instructing them on its use and care.

If conditions change on a project site or PPE fails for any reason, the PPE originally selected for employee protection must be re-evaluated. Re-evaluation should include the following elements:

- Levels of exposure, established through appropriate site monitoring;
- Adequacy of PPE originally selected;
- Number of hours PPE must be worn;
- Adequacy of training and fitting of PPE;

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- Adequacy of PPE program records;
- Recommendations for H&S program improvement and modification; and
- Coordination with the overall H&S program.

4.2.1 Eye and Face Protection

When hazards present as a result of flying particulates, molten metal, liquid chemicals that are highly acidic or basic, chemical gases or vapors, or ionizing or nonionizing radiation, a combination of safety glasses, safety goggles, and/or face shields should be worn. For employees who wear prescription glasses, [NAM-1310-WI1](#) (*Prescription Safety Eyewear*) provides additional details regarding purchase and care of prescription safety glasses.

4.2.2 Foot Protection

In most field situations, protective footwear should be worn by employees performing work in the field. Employees performing ancillary work activities, such as client meetings or work in the office environment at a client site, are not required to wear protective footwear unless client requirements dictate their use. [NAM-1310-WI2](#) (*Protective Footwear*) provides additional details regarding selection and purchase.

4.2.3 Hand Protection


Gloves provide protection against a wide variety of hazards, including chemical exposure, burns, cuts, and other hand injuries. [NAM-1324-PR1](#) (*Safe Use of Cutting Tools*) provides additional information on gloves types providing protection from cuts.

4.2.4 Head Protection

Hard hats approved by the American National Standards Institute (ANSI)/International Safety Equipment Association (ISEA) must be worn whenever a hazard exists from falling objects or other impact/bump hazards. The inner suspension of the hard hat must be inspected regularly and must ensure that at least 1 to 1-1/4" of gap exists between the suspension and the hard hat shell. ERM employees required to wear hard hats shall generally utilize Type 1 Class G (General) hard hats, although other types and classes may be appropriate based on site conditions.

4.3 Training

Employees shall receive initial training on risk assessment and hazard identification as part of ERM's Observation and Feedback Program (OFP) training. This mandatory training is required to be completed by all ERM employees within the first 90 days of employment. Additionally ERM consultants are required to complete training on health and safety planning, including evaluation of various levels of risk evaluation and control (including the use of PPE as a last resort).

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Employees shall receive training on various types of PPE applicable to their project tasks. Training topics include, but are not limited to:

- Routes of exposure;
- Categories of exposure;
- Selection of chemical protective clothing;
- Eye and face protection;
- Hand protection;
- Foot protection;
- Head protection;
- Limitations of PPE;
- Storage, cleaning, and maintenance of PPE;
- Proper donning and doffing procedures;
- Adjusting PPE and determining proper fit; and
- Disposal of PPE.

Retraining will be conducted if any of the following occur:


- Employee observed not using appropriate PPE for task;
- Employee observed using PPE in a manner that is inconsistent with previous training;
- Changes in types of PPE used; and
- New hazards identified at the site which required the use of a different level or type of PPE.

All training is tracked in ERM's Academy learning Management System (LMS).

4.4 Usage, Storage, and Maintenance

All PPE must be kept clean and properly maintained by the employee to whom it is assigned. PPE will be inspected, cleaned, and maintained by employees at regular intervals as part of their normal job duties. Project Managers are responsible for ensuring compliance with cleaning of PPE by employee working on their projects.

In ERM's typical role on projects, PPE does not become grossly contaminated. During projects where chemical contamination of PPE occurs, PPE will be decontaminated (if it is to be reused) or discarded in accordance with waste management practices for the project site. If gross contamination with liquid chemicals occurs, employees will immediately stop work and proceed

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to the decontamination area. Details of PPE and equipment decontamination are specified for each project in the site-specific HASP and/or JHA.

Change rooms and shower rooms are not typically required for ERM projects due to several factors, including the short duration and non-permanency of the projects. In the event change rooms and shower rooms are required for a project, details will be included in the site-specific HASP.


All PPE will be inspected prior to use and any damaged or defective PPE will not be used. All damaged or defective PPE will be immediately discarded.

4.5 ERM-Provided PPE

ERM provides PPE to our employees in accordance with applicable regulatory standards. Prescription safety glasses and protective footwear are subsidized (see [NAM-1310-WI1](#) and [S3-NAM-1310-WI2](#), respectively). Employees are discouraged from providing their own PPE. Employees are responsible for ensuring that ERM-provided PPE is maintained and replaced as needed. During routine inspections of field-based activities, the Field Safety Officer (FSO), Project Manager, or Business Unit Health and Safety Director will observe the condition of employee PPE.

5. References

- ERM Work Instruction [NAM-1320-WI1](#) (*Prescription Protective Eyewear*)
- ERM Work Instruction [NAM-1320-WI2](#) (*Protective Footwear*)
- ERM Work Instruction [NAM-1320-WI3](#) (*Selection, Care, and Use of Flame-Resistant Clothing*)
- ERM Procedure [NAM-1311-PR1](#) (*Respiratory Protection*)
- ERM Procedure [NAM-1312-PR1](#) (*Hearing Conversation*)
- ERM Procedure [NAM-1324-PR1](#) (*Safe Use of Cutting Tools*)

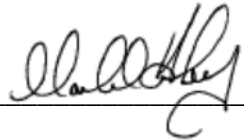
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	Title:	Personal Protective Equipment	Last Revision Date:	2/15/19

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Original Effective Date: 2/10/15


Policy Approval by: Mark Hickey

Approval Signature: _____



Revision History

Section	Reason for Revision	Date
All	New document.	2/10/15
All	Reformatted to meet ERM Global standards; language changes for clarity	1/14/16
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/10/17
4.3	Included discussion of risk assessment training	1/16/18
4.1	Revised criteria for workplace hazard assessments	2/15/19

	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1311-PR1	3
	Title:	Respiratory Protection	Last Revision Date:	1/9/17

1. Purpose and Scope

This document establishes safe work procedures to be used by ERM to minimize exposure to respiratory hazards. Other types of hazard mitigation – including elimination, substitution, engineering controls, and administrative controls – are the best methods of hazard mitigation; however, in many cases these controls are not feasible or do not completely control the identified hazards. In those cases, respiratory protection may be used.

This procedure is applicable to all ERM operations where respiratory protection is required.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this program is implemented, understood, and followed by employees under their charge; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director.

Project Manager/Supervisor: Responsible for the following elements:


- Implement program during any project activities where the use of respiratory protection is determined to be necessary;
- Perform observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of respiratory protection procedures during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

Regional Health and Safety Director: Serve as the Respiratory Protection Program Administrator. The Regional Health and Safety Director will be assisted by the various Business Unit Health and Safety Directors in completing program responsibilities. Duties include the following elements:

- Evaluate hazards and identify work areas, processes or tasks requiring workers to wear respirators;
- Oversee selection of respiratory protection;

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- Monitor respirator use to ensure appropriate respirators are being used based on the hazards present;
- Arrange or conduct training;
- Ensure proper storage and maintenance of respiratory protection equipment;
- Administer the medical surveillance program;
- Maintain the records required by the program;
- Evaluate the program; and
- Update this procedure, as needed.


Field Safety Officer: Responsible for the following project-specific elements (in conjunction and/or under the direction of the Project Manager and Business Unit Health and Safety Director):

- Ensure that elements of this procedure are understood by employees required to wear respiratory protection on their project;
- Verify project team members required to use respiratory protection have received appropriate training, fit testing, and medical surveillance;
- Ensure the availability of appropriate respiratory protection;
- Be aware of tasks requiring the use of respiratory protection;
- Enforce the proper use of respiratory protection when necessary;
- Ensure that respirators are properly cleaned, maintained, and stored;
- Monitor work areas and operations to identify respiratory hazards; and
- Coordinate with the Program Administrator (or designee) on how to address respiratory hazards or other concerns regarding the program.

Employee: Responsible for complying with the requirements stated within the procedure.

3. Definitions

- **Compressed Gas Association (CGA):** International association focused on the safe, secure, and environmentally responsible manufacture, transportation, storage, trans-filling, and disposal of industrial and medical gases and their containers.
- **Immediately Dangerous to Life or Health (IDLH):** Exposure to airborne contaminants that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.

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- **National Institute for Occupational Safety and Health (NIOSH):** U.S. federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness.

4. Procedure

4.1 Selection Procedures

The Program Administrator (or designee) will select respirators to be used, based on the hazards to which the workers are exposures and in accordance with applicable regulatory standards. The Program Administrator will conduct a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. The hazard evaluation will include the following:

- Identification and development of a list of potential hazardous substances to be encountered at the site;
- Review of work processes to determine where potential exposures to these hazardous substances may occur; and
- Exposure monitoring to quantify potential hazardous exposures.


4.2 Hazard Assessment

The Project Manager, with assistance from the Program Administrator or designee, will revise and update the Job Hazard Analysis (JHA) or Health and Safety Plan (HASP) as needed (i.e., any time work process changes may potentially affect exposure). If an employee feels that respiratory protection is needed during a particular activity and not previously provided for in the HASP or JHA, the Project Manager, FSO or the Program Administrator should be contacted. The Program Administrator will evaluate the potential hazard and then communicate the results of that assessment back to the employees. If it is determined that respiratory protection is necessary, all other elements of this procedure will be in effect for those tasks.

4.3 NIOSH Certification

Respirator approval is granted by NIOSH via test certification (TC) numbers. Only those respirators that have received NIOSH approval will be issued, and all component and replacement parts must also have NIOSH approval. Cartridges, canisters, filters, air lines and regulators cannot be interchanged among different brands of equipment or among equipment of a given manufacturer unless specifically approved.

Air-purifying respirators (APRs) selectively remove specific airborne contaminants such as, particulates, gases, fumes and vapors from ambient air by filtration, absorption or adsorption. Three types of air purifying devices exist:

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- Particulate filters, which remove particulates;
- Cartridges and canisters, which contain sorbents for specific chemicals, gases and vapors; and
- Combination devices.

Conditions that exclude the use of APRs are as follows:

- Oxygen deficiency;
- IDLH conditions;
- Entry into an unventilated or confined area;
- Presence of unidentified contaminants;
- Contaminant concentration unknown or exceeding designated maximum use concentration;
- Identified chemicals with inadequate or no warning properties; and
- Presence of two or more incompatible contaminants on site that might react in the cartridge to produce a toxic or hazardous condition.


Each respirator canister or cartridge will describe the name of the atmospheric containment it protects against and will have a distinctive color or combination of colors.

ERM generally does not have project conditions that require employees to use supplied-air respirators. However, where the conditions require their use, ERM will provide specialized training and fit testing for employees who use self-contained breathing apparatus (SCBA) or air-line respirators (ALR).

SCBAs consists of a face piece connected by a hose and a regulator to an air source (compressed air, compressed oxygen, or an oxygen-generating chemical) carried by the wearer. SCBAs are the only respirators that can be used for entry into IDLH atmospheres. Compressed air cylinder used with a SCBA shall meet U.S. Department of Transportation (DOT) requirements. Breathing air quality requirements of Grade D breathing air, as described by the Compressed Gas Association (CGA) include the following:

- Oxygen (O₂) content must be between 19.5 and 23.5%, with the remainder mainly nitrogen;
- Hydrocarbon concentrations must not exceed 5 milligrams per cubic meter (mg/m³);
- Carbon monoxide (CO) concentrations must not exceed 20 parts per million (ppm);
- Carbon dioxide (CO₂) concentrations must not exceed 1000 ppm; and
- There must not be any pronounced odor.

ALRs with positive-pressure or continuous flow with escape provisions provide the highest level of protection and are recommended for use in remedial actions involving hazardous materials.

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ALRs cannot be used for entry into IDLH atmospheres unless the apparatus is equipped with an emergency escape bottle, or the employee also wears an escape SCBA. All ALR couplings must be incompatible with the outlets of other gas systems used on site to prevent a worker from connecting to a hazardous source. ALRs enable longer work periods than SCBAs and are less bulky, but they restrict mobility and are vulnerable to damage. The use of air compressors as an air source for an ALR is severely limited by the quality of the ambient air.


4.4 Medical Evaluation

Employees who are required to wear respirators must be medically evaluated before being permitted to wear a respirator. A licensed physician will provide the medical evaluations. Evaluations will be administered confidentially during normal working hours (or at a time and place convenient to the employee) and in such a manner that the employee understands the content.

Medical evaluation procedures are as follows:

- Evaluations occur during the initial employment physical and during annual or biennial evaluations thereafter (depending on the amount of time the employee spends in a respirator).
- Prior to the physical, employees complete the medical questionnaire provided by the physician.
- If requested, employees will be given the opportunity to speak with the physician about their medical evaluation.
- Any employee required for medical reasons to wear a positive pressure air-purifying respirator will be provided with a powered air purifying respirator (PAPR). A PAPR is an APR fitted with a powered blower to force air through the air-purifying elements.
- Additional medical evaluations will be provided under the following circumstances:
 - Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing;
 - The physician or Project Manager informs the Program Manager that the employee needs to be re-evaluated;
 - Information from this program, including observations made during fit testing and program evaluation, indicates a need for re-evaluation; or
 - Changes occur in workplace conditions that may result in an increased physiological burden on the employee.

All examinations and questionnaires are to remain confidential between the employee and the physician. The physician provides ERM with medical clearance only, not details of medical findings. The physician communicates details of the medical examination and findings directly to the employee.

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Note: For ERM's Canadian employees, ERM Form [CAN-1311-FM1](#) (*Respirator User Screening Form*) may be used as an aid in determining if additional medical advice is required prior to using a respirator. Employees shall contact their Business Unit Health and Safety Director regarding use of this form.

4.5 Fit Testing

Qualitative fit testing is required for employees wearing any type of respirator under the following conditions:

- Prior to being allowed to wear any respirator with a tight fitting facepiece;
- Annually; and
- When there are changes in the employee's physical condition that could affect face-to-facepiece (e.g., obvious change in body weight, facial scarring, etc.).

Employees will be fit tested with the same make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they find an optimal fit. Testing will be documented using ERM Form [NAM-1311-FM1](#) (*Qualitative Fit Test Form*).


4.6 General Use Procedures

Employees shall:

- Use their respirators under conditions specified by this program and detailed in a project-specific HASP and associated JHA.
- Conduct fit checks each time that they wear their respirator. Employees will use both positive and negative pressure fit checks.
- Leave the work area for the following reasons:
 - To wash their face and the respirator facepiece as necessary to prevent skin and eye irritation;
 - To clean their respirator if the respirator is impeding their ability to work;
 - To change filters or cartridges, replace parts, or to inspect respirator if it stops functioning as intended; and
 - If they detect gas or vapor breakthrough, changes in breathing resistance, or leakage of the facepiece. If an employee detects any of these conditions, the respirator must be repaired or replaced prior to returning to the work area.

Employees shall not:

- Wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good face-to-facepiece seal; and

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- Wear headphones, jewelry, or other articles that may interfere with the face-to-facepiece seal.

4.7 Positive and Negative Fit Check Procedures

Positive pressure fit check procedures include:

- Don respirator and adjust straps for a proper fit.
- Close off the exhalation valve by placing your hand over it.
- Exhale gently into the facepiece.
- If a slight positive pressure builds up inside the facepiece without any evidence of outward leakage of air at the face-to-facepiece seal, the fit is satisfactory.
- If the fit is unsatisfactory, reposition the facepiece, readjust the straps, and repeat the fit check procedures.

Negative pressure fit check procedures include:

- Don respirator and adjust straps for proper fit.
- Cover the cartridges or filters with the palms of your hands. If the palm of your hand does not completely cover the cartridge or filter, use a thin nitrile glove or a piece of paper.
- Inhale gently so that the facepiece collapses slightly and hold your breath for ten seconds.
- If the facepiece remains slightly collapsed for the ten seconds and no inward leakage of air is detected, the fit is satisfactory.
- If the fit is unsatisfactory, reposition the facepiece, readjust the straps, and repeat the fit check procedure.


4.8 Emergency Procedures

Since ERM employees are not trained as emergency responders and are not authorized to act in such a manner, procedures for use of respiratory protection during emergencies are not provided.

4.9 Respirator Malfunction

For any malfunction of an APR such as, but not limited to, filter breakthrough, facepiece leakage, or improperly working valve, the respirator wearer should inform the FSO that the respirator no longer functions as intended. The employee must receive the needed parts to repair the respirator or receive a new respirator.

All employees wearing an ALR will work with a buddy. Buddies shall assist employees who experience an ALR malfunction as follows:

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- The employee experiencing the malfunction should signal to the buddy that he or she has a respirator malfunction.
- The buddy shall don an emergency escape respirator and aid the employee by escorting them to an area where the employee can safely remove the ALR.

4.10 IDLH Procedures

The potential for IDLH conditions to occur will be evaluated and documented in the HASP or JHAs. If an IDLH atmosphere is detected, the following requirements will be implemented at a minimum:

- One or more employees (“attendants”) will be located outside the area containing the IDLH atmosphere.
- Communication will be maintained between the employee(s) within the IDLH atmosphere and the attendant via direct sight, voice, or electronic signal (i.e., radio, cell phone, etc.).
- Attendants will be trained and equipped to provide emergency rescue.
- The Project Manager/Supervisor will be notified before an attendant attempts to provide emergency rescue.
- Once authorized to do so, the attendant will provide necessary assistance appropriate to the situation. If an attendant must enter the IDLH atmosphere to render appropriate aid, he will only do so after another attendant has assumed his responsibilities outside the IDLH atmosphere.


Attendants outside the IDLH atmosphere will be equipped with:

- Pressure demand or other positive pressure SCBA, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
 - Appropriate retrieval equipment for removing employees from the IDLH atmosphere; or
 - Equivalent means of rescue when retrieval equipment is not required.

4.11 Breathing Air Quality

For supplied-air respirators, only Grade D breathing air or better shall be used. Pure oxygen will never be used. Where bottled air is used, a certificate of analysis must accompany the bottle to certify compliance with Grade D requirements. Where compressors are used to supply breathing air, they must:

- Prevent entry of contaminated air into the air supply (i.e., be located in a clean environment);
- Minimize moisture content;
- Have suitable in-line sorbent beds and filters to provide appropriate air quality;

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- Have a tag/log of purification system elements to indicate most recent change date; and
- Have a high carbon monoxide alarm that sounds at 10 ppm.

Couplings on any supplied air system must be incompatible with other gas systems

4.12 Cleaning and Storage

Respirators issued for the exclusive use of an employee will be cleaned as often as necessary, but at least once a day during field use. Atmosphere-supplying respirators are to be cleaned and disinfected after each use. The following procedure is to be used when cleaning and disinfecting respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges;
- Wash the face piece and associated parts in mild detergent with warm water – do not use organic solvents;
- Rinse completely in clean warm water;
- Wipe the respirator with disinfectant wipes (70% Isopropyl Alcohol) to kill germs;
- Air dry in a clean area;
- Reassemble the respirator and replace any defective parts; and
- Place in a clean, dry plastic bag or other airtight container.


Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their respirator in accordance with the provisions of this program and will store their respirator in a plastic bag in their office. Each employee will have his/her name on the bag and that bag will only be used to store that employee's respirator.

4.13 Maintenance

Respirators are to be properly maintained at all times in order to ensure that they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Respirators with worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer. The manufacturer will conduct repairs to regulators or alarms of atmosphere-supplying respirators.

The following checklist will be used when inspecting respirators:

- Face piece – cracks, tears, or holes, facemask distortion, cracked or loose lenses/face shield;
- Head straps – breaks or tears, broken buckles;
- Valves – residue or dirt, cracks or tears in valve material;

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- Filters/cartridges – approval designation, gaskets, cracks or dents in housing, proper cartridge for hazard; and
- Air supply systems – breathing air quality/grade, condition of supply hoses, hose connections, settings on regulators and valves.

Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area that is free of respiratory hazards.

4.14 Change Schedules

Employees wearing air purifying respirators with P100 filters for protection against dust and other particulates shall change the cartridges on their respirators when they first begin to experience difficulty breathing (i.e., resistance) while wearing their respirators. Change schedules for other substances will be addressed in HASP or JHAs.

4.15 Defective Respirators

Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his or her supervisor. FSOs or employees will give all defective respirators to the Program Administrator (or their designee). The Program Administrator will decide whether to:

- Temporarily take the respirator out of service until it can be repaired;
- Perform a simple fix on the spot such as replacing a head strap; or
- Dispose of the respirator due to an irreparable problem or defect.

When a respirator is taken out of service for an extended period of time, the respirator will be tagged out of service, and the employee will be given a replacement of similar make, model, and size.


4.16 Training

ERM requires that all respirator users receive appropriate training. Training will be provided:

- Before they are assigned a respirator;
- Annually thereafter;
- Whenever a new hazard or job is introduced; and
- Whenever employees fail to demonstrate proper use of knowledge of respirator use.

Training must address the following at a minimum:

- Why the respirator is necessary and what conditions can make the respirator ineffective;

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- What the limitations and capabilities of the respirator are;
- How to use respirators effectively in emergency situations;
- How to inspect, don and doff, and check the fit of the respirator;
- What the maintenance and storage procedures are; and
- How to recognize the signs and symptoms that may limit or prevent the effective use of the respirator.

4.17 Program Evaluation

The Program Administrator will conduct periodic evaluations of the workplace to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and a review of records.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to ERM management, and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.


4.18 Documentation and Recordkeeping

A written copy of this program is maintained on ERM's Document Control System (DCS) and is available to all employees who wish to review it.

WorkCare, ERM's Medical Recordkeeping Coordinator, will maintain the medical records for all employees covered under the respirator program. The completed medical questionnaire and the physician's documented findings are confidential and will remain with the physician. ERM will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

5. References

- ERM Form [NAM-1311-FM1](#) (*Qualitative Fit Test Form*)
- ERM Form [CAN-1311-FM1](#) (*Respirator User Screening Form*)

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Revision History

Section	Reason for Revision	Date
All	New document.	3/17/14
All	Reformatted to meet ERM Global standards; language changes for clarity	1/22/16
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/9/17

	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1312-PR1	6
	Title:	Hearing Conservation	Last Revision Date:	6/26/18

1. Purpose and Scope

This procedure describes the requirements for prevention of occupational noise-induced hearing loss in those employees working in potentially noisy areas. Implementation of this hearing conservation procedure is required whenever noise exposures equal or exceed an 8-hour time-weighted average (TWA) of 85 decibels (dB). It is ERM policy that its employees will not be exposed to noise that exceeds 85 dB averaged over an 8-hour work day. Protective measures to mitigate exposure to hazardous sound levels will include the use of engineering controls, work practices and hearing protection devices.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director or other staff member.

Project Manager: Responsible for the following elements:

- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Regional Health and Safety Director: Responsible for the development and implementation of this procedure.


Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

Employee: Responsible for the use of provided hearing protection in all designated areas.

3. Definitions

- **Decibel (dB):** A unit used to measure the intensity of a sound by comparing it with a given level on a logarithmic scale.
- **Hertz (Hz):** A unit of frequency equal to one cycle per second.

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- **High noise area:** A work area in which employee noise exposures equal or exceed 85 dB (decibels) averaged over an eight hour workday.
- **Standard threshold shift (STS):** A change in hearing threshold relative to a baseline audiogram of an average 10 dB or more at 2000, 3000, and 4000 Hz in one or both ears.

4. Procedure

4.1 Noise Monitoring

Noise monitoring to characterize potential noise exposure will be conducted wither by a subject matter expert familiar with noise monitoring or a Field Safety Officer (FSO) that has received training in conducting noise monitoring. Both personal monitoring using noise dosimeters and area monitoring using a sound level meter may be conducted. Noise monitoring will be repeated whoever a change in production, process equipment, or controls occurs which could affect the number of employees exposed or render the attenuation of hearing protector no longer effective.

4.2 Employee Notification

All employees participating in personal noise monitoring will be notified of their results. Any employee whose exposure is determined to have met or exceeded 85 dB as an 8-hour TWA will be notified in writing within 15 calendar days. The results of area noise surveys will be communicated to project team members during daily site safety meetings.

4.3 Observation of Monitoring


Employees or their designated representatives will be offered the opportunity to observe any noise monitoring conducted which impacts their job or position.

4.4 Audiometric Testing

ERM employees who are exposed to noise at or above 85 dB as an 8-hour TWA within the working environment will receive a baseline audiogram within six months of the first exposure. Annually after obtaining the baseline audiogram, the employee shall receive a new audiogram for comparison to the baseline.

In preparation for both baseline and annual examinations, employees will be instructed to avoid noisy environments at both work and home for at least 14 hours before audiometric testing. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

Each employee's annual audiogram will be compared to the baseline audiogram. If the results of the annual audiogram indicate a standard threshold shift (STS), an average change

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in hearing threshold of 10 dB or more at the 2000, 3000, and 4000 Hz frequency in either ear relative to the baseline audiogram, the following actions will be taken (unless the shift is determined to be non-occupational in nature):

- The employee will be notified in writing with 21 days of the determination;
- The employee shall be referred for additional medical follow-up, as appropriate;
- Employees using hearing protectors will be refitted and retrained in their use;
- Where necessary, hearing protectors with greater noise attenuation properties will be offered; and
- Employees not using hearing protectors will be fitted with such, trained in their care and use, and required to use them.

Employees or their designated representatives will be offered the opportunity to observe any noise monitoring conducted. These tests are conducted at no cost to the employee. Results of audiograms and employee physicals will be forwarded directly to each employee within 10 working days of receipt of results.

4.5 Hearing Protectors and Hearing Protector Attenuation

A variety of hearing protectors will be provided to the employees at no cost. Hearing protectors will be maintained in good condition. Employees will wear hearing protectors in all designated high noise areas while performing tasks that generate loud noises (e.g., use of portable power tools) and while working within 25 feet of noisy operations (e.g., drilling).

The adequacy of the hearing protector will be evaluated to ensure that the hearing protector attenuates the employee exposure to an 8-hour TWA of 85 dB or less. The FSO is responsible for making this determination.


For work performed at client's location, the employees must observe posted noise signage and implement controls as needed.

4.6 Training

Hazard recognition and general awareness training on hearing conservation is provided to all ERM employees during the new hire orientation process which occurs during the first week of employment. Recognition of completion of this training is provided in ERM's Academy Learning Management System (LMS). A certificate of training is available to all employees.

Where employees are required to work regularly in areas where their exposure to noise is determined to be, or has the potential to be, in excess of 85 dBA as an 8-hour TWA, additional annual training will provide. The training will contain at least the following elements:

- Effects of noise on hearing;

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- Purpose of hearing protectors and manufacturer's instructions on use and fitting;
- Advantages/disadvantages and attenuation of various types of hearing protectors;
- Instructions on selection, fitting, use, and care of hearing protectors (in accordance with manufacturer instructions);
- Purpose of audiometric testing program including an explanation of the test procedure; and
- Changes in ERM work processes and/or personal protective equipment (PPE) used.

4.7 Recordkeeping


Audiometric testing records will be maintained for each affected employee and contain the following information:

- Name and job classification;
- Date of audiogram;
- Name of person conducting audiogram;
- Date of last acoustic or exhaustive calibration of audiometer; and
- Employee's most recent noise exposure assessment.

Records of audiometric testing will be maintained by ERM's medical consultant WorkCare. All audiometric testing records shall be maintained for the duration of employment plus thirty years. All noise monitoring records shall be maintained for the duration of employment.

5. References

- US Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.95 (*Occupational Noise Exposure*)
- Ontario Occupational Health and Safety Act (OHSA) Regulation 381/15 (*Noise*)

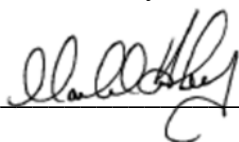
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Section	Reason for Revision	Date
All	New document.	3/17/14
All	Reformatted document. Minor language changes for clarity.	6/24/15
1.0	Added line clarifying that ERM employees will not be exposed to noise levels in excess of 85 dB averaged over an 8-hour day.	12/15/15
4.6	Updated training requirements	8/3/16
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/6/17
1, 4.5, 5	Revised Purpose statement (Section 1); added information on compliance with client requirements (Section 4.5); added reference to Ontario regulations	6/26/18

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	North America		NAM-1323-PR1	2
	Title:	Cold Stress	Last Revision Date:	1/6/17

1. Purpose and Scope

This procedure establishes minimum requirements for work in environments where exposures to cold stress are encountered and provides guidance to evaluate and control these stressors. This procedure is applicable to all North American operations, and will be made available to employees at the work site upon request.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety director or other staff member.

Project Manager: Responsible for the following elements:


- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

3. Definitions

- **Temperature:** The dry bulb temperature in degrees Fahrenheit (°F) or Celsius (°C).
- **Frostbite:** Injury caused by freezing of the skin and underlying tissues.
- **Hypothermia:** A medical emergency that occurs when the body loses heat faster than it can produce it, creating a dangerously low internal body temperature, typically less than 95 °F (35 °C).

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4. Procedure

Cold stress can present a significant hazard to workers and can result in hypothermia or frostbite. Several factors incorporate the harmful effects of cold, including wet clothing, smoking, drinking alcoholic beverages, fatigue, emotional stress and certain diseases and medications.

4.1 Classification and Prevention

4.1.1 Hypothermia

Hypothermia is a potentially life threatening condition which results in a drop in the body's core temperature. At lower body temperatures, the body can react by a reduction in mental awareness, reduced rational decision making, loss of consciousness, and death.

The signs and symptoms of hypothermia include shivering, dizziness, numbness, confusion, weakness, impaired judgment, impaired vision and drowsiness. The stages of hypothermia are shivering, apathy, loss of consciousness, decreasing pulse and breathing rates, and death

First aid measures for hypothermia include calling emergency medical services and moving the victim to a warm area and into dry clothing.

4.1.2 Frostbite

Frostbite is the most common injury caused by cold. It happens when ice crystals form in body tissues, usually the nose, ears, chin, cheeks, fingers, or toes. This restricts blood flow to the injured parts. The effect is worse if the frostbitten parts are thawed and then refrozen.


Signs and symptoms of frostbite include an initial slight flushing of the skin. The skin color then changes to white and then grayish blue. Pain is sometimes felt early but later goes away. The frostbitten parts feel very cold and numb, and the victim may not be aware of the injury. In severe cases, frostbite may result in blisters or gangrene.

First aid measures for frostbite include moving the victim to a warm area and placing the frozen parts in warm water (100 to 105 °F/37.8 to 40.5 °C). Handle them gently and do not rub or massage them. Loosely bandage the injured parts. Seek prompt medical attention.

4.2 Recognition, Prevention, and Control

The first signs of cold stress are pain in the extremities. Severe shivering may result as body temperature drops.

Protection from cold stress must be considered in addition to provisions for personal protective equipment. Provisions for insulating dry clothing must be provided, regularly inspected, and replaced as required.

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Wind chill can substantially reduce the cooling rate experienced by personnel. Prevention of excessive cooling exacerbated by wind chill condition requires increased insulation value of the protective work clothing. The effects of wind chill and temperature can be referenced in [NAM-1323-WI1](#) (*Equivalent Chill Temperatures*).


The following work practices should be followed to minimize the effects of cold stress conditions:

- Wear adequate layers of insulating dry clothing. Keep a change of dry clothes available in case clothing becomes wet. Ensure adequate supplies of cold weather gear are available and stocked.
- Use the buddy system to look for signs of cold stress.
- If appropriate, use windshields to reduce the effects of wind.
- Heated warming shelters should be available when the equivalent chill temperature (ECT) is less than 20°F (-29°C). See NAM-1323-WI1 for additional information.
- To prevent dehydration, which can increase the susceptibility of workers to cold injuries, warm sweet drinks and soups should be provided. Coffee and soft drink intake should be limited due to the diuretic effects.
- Consult [NAM-1323-WI2](#) (*Work/Warm-up Schedule*) for guidance on applications of work/warming regimens in extreme cold situations (-15 °F/-26 °C).
- Ensure regularly-used travel pathways are kept as clear of snow and ice as practicable.
- Be aware of the hazards of unstable snow and ice buildup, and avoid working close to areas of accumulated snow and ice whenever possible

4.3 Training Requirements


Worker training should be provided to discuss the hazards of cold stress environments and to review preventative work practices. Training is conducted during daily tailgate safety meetings when working in cold environments. This ensures more effective and timely training than a once-annual session. The training should include:

- Proper clothing and PPE requirements;
- Recognition, prevention, and first aid treatment of frostbite and hypothermia, including a discussion of re-warming procedures;
- Suggested work/rest regimens and eating/drinking habits; and
- Safe work practices in cold stress environments.

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5. References

- ERM Work Instruction [NAM-1323-WI1](#) (*Equivalent Chill Temperatures*)
- ERM Work Instruction [NAM-1323-WI2](#) (*Work/Warm-up Schedule*)

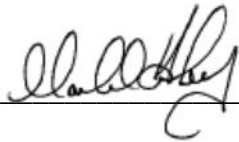
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	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1323-PR2	4
	Title:	Heat Stress	Last Revision Date:	1/16/17

1. Purpose and Scope

This procedure establishes minimum requirements for work in environments where exposures to heat stress are encountered and provides guidance to evaluate and control these stressors. This procedure is applicable to all North American operations, and will be made available to employees at the work site upon request.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director or other staff member.

Project Manager: Responsible for the following elements:


- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

3. Definitions

- **Acclimatization** – The temporary adaptation of the body to work in the heat. Acclimatization peaks in most people within 4 to 14 days of regular work for at least two hours per day in the heat.
- **Heat Illness** – A serious medical condition resulting from the body's inability to cope with a particular heat load; includes heat cramps, heat rash, heat exhaustion, and heat stroke.
- **Environmental risk factors for heat illness** – Working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement,

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workload severity and duration, protective clothing and personal protective equipment worn by employees (e.g., impervious clothing vs. standard work attire).


- **Personal risk factors for heat illness** – Factors such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.
- **Shade** – Blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning. Shade may be provided by any natural or artificial means that does not expose employees to unsafe or unhealthy conditions and that does not deter or discourage access or use.
- **Temperature** – The dry bulb temperature in degrees Fahrenheit (°F) or Celsius (°C).

4. Procedure

4.1 Classification and Prevention

4.1.1 Heat Stroke

- **Condition:** (a) Hot dry red skin, (b) high and rising core temperature 105°F (40 °C) and over; and (c) brain disorders, including mental confusion, loss of consciousness, convulsions, or coma, as core temperature continues to rise. Heat stroke can be fatal if treatment is delayed.
- **Predisposing Factors:** (a) Sustained exertion in heat by non-acclimatized workers; (b) obesity and lack of physical fitness; (c) recent alcohol intake; (d) dehydration; (e) individual susceptibility; and (f) chronic cardiovascular disease in the elderly.
- **Corrective Actions:** Immediate and rapid cooling by immersion in chilled water with massage or by wrapping in wet sheet with vigorous fanning with cool dry air. Avoid overcooling. Treat shock if present. Seek medical attention.
- **Prevention:** Medical screening of workers. Selection based on health and physical fitness. Acclimatization for 8 to 14 days by graded work and heat exposure. Monitoring workers during sustained work in severe heat environments.

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4.1.2 Heat Exhaustion

- Clinical Features: (a) Fatigue, nausea, headache, giddiness; (b) skin clammy and moist, complexion pale, muddy, or with hectic flush; and (c) may faint on standing, with rapid pulse and low blood pressure.
- Predisposing Factors: (1) Sustained exertion in heat, (2) lack of acclimatization, and (3) failure to replace water and/or salt lost in sweat.
- Treatment: Remove to cooler environment. Provide fluids with electrolytes such as Gatorade™ or equivalent. Seek medical attention.
- Prevention: Acclimatize workers using a breaking-in schedule for 1 to 2 weeks. Supplement dietary salt only during acclimatization. Ensure ample drinking water, Gatorade™ or equivalent is available at all times and taken frequently during the day.

4.1.3 Heat Cramps


- Clinical Features: Painful spasms of muscles used during work (arms, legs, or abdominal). Onset can occur during or after work hours.
- Predisposing Factors: (1) Heavy sweating during hot work and (2) drinking large volumes of water without replacing salt loss.
- Treatment: Drinking liquids with salt supplement such as Gatorade™ or equivalent. Seek medical attention.
- Prevention: Adequate salt intake with meals. In un-acclimatized persons, provide salted (0.1 percent) drinking water.

4.1.4 Heat Rash

- Clinical Features: Profuse tiny raised red blisters on affected areas. Pricking sensations during heat exposure.
- Predisposing Factors: Unrelieved exposure to humid heat with skin continuously wet with un-evaporated sweat.
- Treatment: Seek medical attention.
- Prevention: Cooled resting and sleeping quarters to allow skin to dry between heat exposures.

4.2 Prevention Procedures

Working in a hot environment requires that employers take precautions and provide adequate protection to prevent heat stress. The following procedures should be utilized on ERM project sites to recognize and prevent heat stress conditions.


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4.2.1 Monitoring and Risk Evaluation

- Track the weather forecast for the job site and use forecasted information to plan daily activities. Forecasts may be obtained from National Weather Service, Weather Channel, local news, or other available reliable source.
- Review this procedure at daily tailgate safety meetings, including:
 - Encouraging employees to drink plenty of water and not wait until they are thirsty,
 - Reminding employees of their right to take a cool-down rest in the shade when necessary,
 - Establishing the number and schedule of water and rest breaks, and
 - Reviewing the signs and symptoms of heat illness and emergency response procedures in the project-specific health and safety plan (HASP) with all workers onsite.
- Use a thermometer to measure the outdoor temperature in an area where there is no shade. While the temperature measurement must be taken in an area with full sunlight, the bulb or sensor of the thermometer should be shielded while taking the measurement (e.g., with the hand or some other object) from direct contact by sunlight.
- The U.S. Occupational Safety and Health Administration (OSHA) has made available a Heat Safety Tool for use on smartphones (https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html). The tool allows workers and supervisors to calculate the heat index for their worksite and, based on the heat index, display a risk level to outdoor workers. The tool also provides reminders about the measures that should be taken at that risk level to protect workers from heat-related illness.

4.2.2 Establishing Work Assignments and Work/Rest Regimens

- Make assignments for work involving physical labor and heat stress based on physical fitness level of available labor pool. Employees newly exposed to heat should begin their work level at 50% of suggested work schedule and increase level by 10% per day to allow for acclimatization.
- An employee who has been newly assigned to a high heat area should be closely observed by the supervisor or Field Safety Officer (FSO) for the first 14 days of the employee's employment.
- Supervision and the “buddy system” should be used to carefully observe workers in heat stress environments to evaluate each individual’s susceptibility to heat stress. Any employee exhibiting signs of heat stress should be promptly investigated.
- All employees shall be closely observed by the supervisor or FSO during a heat wave. For purposes of this section, “heat wave” means any day in which the predicted high temperature


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for the day will be at least 80 °F (27 °C) and at least 10 °F (5 °C) higher than the average high daily temperature in the preceding five days.

- Initiate a modified work/rest regimen when ambient temperatures and protective clothing create a potential heat stress hazard. If ambient temperatures are greater than or equal to 75°F, the following work/rest regimen is recommended (guidelines assume light to moderate work):

<u>Temperature</u>	<u>Work Period</u>	<u>Rest Period</u>
75 – 80 °F/24 – 27 °C	90 Minutes	15 Minutes
80 – 85 °F/27 – 29 °C	60 Minutes	15 Minutes
85 – 90 °F/29 – 32 °C	45 Minutes	15 Minutes
90 – 95 °F/32 – 35 °C	30 Minutes	15 Minutes

- Rest periods should be taken in a shaded area as described in Section 4.2.3 with open air movement, if available, as this will considerably reduce the effects of heat stress.
- Employees shall be allowed and encouraged to take a preventative cool-down rest in the shade for a period of no less than five minutes at a time when they feel the need to do so to protect themselves from overheating. Such access to shade shall be permitted at all times. An individual employee who takes a preventative cool-down rest:
 - Shall be monitored and asked if he or she is experiencing symptoms of heat illness;
 - Shall be encouraged to remain in the shade; and
 - Shall not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event less than five minutes in addition to the time needed to access the shade.
- If an employee exhibits signs or reports symptoms of heat illness while taking a preventative cool-down rest or during a preventative cool-down rest period, the supervisor or FSO shall provide appropriate first aid or emergency response, as outlined in Section 4.2.5.
- Schedule physically demanding and strenuous tasks, or tasks requiring full-body chemical protection, for early in the day, if possible.
- Protective clothing inhibits the transfer of heat between the body and the surrounding environment. This can increase the onset of heat stress symptoms. The following consideration should be evaluated when protective clothing is worn in heat stress environments.
 - More frequent rest breaks in the shade;
 - Worker rotation to provide frequent breaks in cool areas;
 - Wear ice vests or vortex tubes, if practical; and

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- Schedule changes to accommodate work at night or early morning hours.


4.2.3 Provision of Water and Shade

- Employees shall have access to potable drinking water that is fresh, pure, suitably cool, and provided to employees free of charge. The water shall be located as close as practicable to the areas where employees are working. Where drinking water is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. Supervisors or FSOs may begin the shift with smaller quantities of water if they have effective procedures for replenishment during the shift as needed to allow employees to drink one quart or more per hour. The frequent drinking of water shall be encouraged.
- When the outdoor temperature in the work area exceeds 80 °F (27 °C), the supervisor or FSO must establish and maintain one or more areas with shade at all times while employees are present that are either open to the air or provided with ventilation or cooling. The amount of shade present shall be at least enough to accommodate 25% of the number of employees on recovery or rest periods, so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other. The shade must be located as close as practicable to the areas where employees are working.
- When the outdoor temperature in the work area does not exceed 80 °F (27 °C), the supervisor or FSO must either provide shade or provide timely access to shade upon an employee's request.
- Where it is infeasible or unsafe to have a shade structure, or otherwise to have shade present on a continuous basis, the project team may utilize alternative procedures for providing access to shade if the alternative procedures provide equivalent protection. Cooling measures other than shade (e.g., use of misting machines) may be provided in lieu of shade if these measures are at least as effective as shade in allowing employees to cool.

4.2.4 High Heat Procedures

When the temperature equals or exceeds 95 °F (35 °C), the following procedures will be implemented to the extent practicable:

- Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor or the FSO when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
- Observing employees for alertness and signs or symptoms of heat illness. The ERM project team must ensure effective employee observation/monitoring by implementing one or more of the following:
 - Supervisor or FSO observation of 20 or fewer employees,

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- Mandatory buddy system,
- Regular communication with sole employee such as by radio or cellular phone, or
- Other effective means of observation.
- Designating one or more employees on each worksite as authorized to call for emergency medical services, and allowing other employees to call for emergency services when no designated employee is available.
- Reminding employees throughout the work shift to drink plenty of water.
- Reviewing the heat stress procedures at daily tailgate safety meetings, encouraging employees to drink plenty of water, and reminding employees of their right to take a cool-down rest when necessary.

4.2.5 Emergency Response Procedures

- If a supervisor or FSO observes, or any employee reports, any signs or symptoms of heat illness, the supervisor or FSO must take immediate action commensurate with the severity of the illness.
- When an employee displays possible signs or symptoms of heat illness, the supervisor or FSO will check the employee and determine whether resting in the shade and drinking cool water will suffice or if emergency service providers will need to be called. WorkCare Incident Intervention (888-449-7787) should also be contacted to provide guidance on appropriate care.
- An employee exhibiting signs or symptoms of heat illness must be monitored and not left alone or sent home without being offered onsite first aid and/or being provided with emergency medical services in accordance with the site HASP.
- If the signs or symptoms are indicators of severe heat illness (such as, but not limited to, decreased level of consciousness, staggering, vomiting, disorientation, irrational behavior or convulsions, incoherent speech, red and hot face), the supervisor or FSO must implement emergency response procedures outlined in the HASP. Emergency service providers must be contacted immediately, and while the ambulance is in route, initiate first aid (follow guidance in Section 4.1.1).
- In the event a heat stress related incident or near miss occurs, the supervisor or FSO will notify the PIC and PM and report the event following guidelines in the HASP.

4.3 Training Requirements

All field employees, including supervisors, shall be provided training on heat stress and working in hot environments in the language that they understand. Training shall be provided prior to working in hot environments and will be documented in ERM's Academy Learning


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Management System (LMS). Employee training to recognize heat stress conditions and the methods necessary to prevent and treat heat stress include:

- The environmental and personal risk factors for heat illness, as well as the added burden of heat load on the body caused by exertion, clothing, and personal protective equipment.
- How to monitor weather reports and how to respond to hot weather advisories.
- The procedures for providing water, shade, cool-down rests, and access to first aid as well as the employees' right to stop work without retaliation.
- The importance of frequent consumption of small quantities of water, up to four cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
- The concept, importance, and methods of acclimatization.
- The different types of heat illness, the common signs and symptoms of heat illness, and appropriate first aid and/or emergency responses to the different types of heat illness.
- The importance to employees of immediately reporting any symptoms or signs of heat illness in themselves or in co-workers.
- ERM procedures contained in the HASP for responding to signs or symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary.

5. References

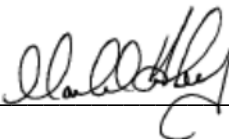
- California Division of Occupational Safety and Health (Cal/OSH) Heat Illness Prevention Standard – California Labor Code Section 226.7

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Approval Signature:  _____

Revision History

Section	Reason for Revision	Date
All	New document.	4/26/10
All	Reformatted document. Edits for clarity; addition of new regulatory information,	6/5/15
4.2.1; 4.2.2; 5	Deleted references to ACGIH TLVs; language added confusion to implementation of procedure	6/8/16
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); changes shade requirements (Section 4); updated References (Section 5)	1/16/17

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	Title:	Safe Use of Cutting Tools	Last Revision Date:	1/11/17

1. Purpose and Scope

This procedure is designed to ensure that ERM employees have formally considered the potential risks associated with the use of cutting tools, including but not limited to knives, shears, snips, scissors, core sleeves, tubing cutters, pruning tools, paper cutters, and hand-held electric saws. The procedure applies to all ERM work activities which involve the use of these tools within offices, equipment storage areas, or field trailers as used by ERM employees, contractors, and consultants.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects;
- See to the performance of periodic inspections in the office and at projects to identify appropriate tools and procedures; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director or other staff member.

Project Manager/Area Manager: Responsible for the following elements:


- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Employees: Responsible for the following elements:

- Perform all work in accordance with this procedure; and
- Formally assess risks from use of cutting tools and take actions to effectively manage identified hazards prior to starting work.

Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

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3. Definitions

Fixed open bladed knife: Any knife where the normal use and position of the tool creates an unguarded knife or razor edge.

4. Procedure


4.1 Hazard Assessment

ERM requires that hazard assessments be performed for all activities, including those that involve the use of cutting tools. A Job Hazard Analysis form ([ERM-1115-FM1](#)) should be used to identify and document the hazards and associated control measures, including selection of the most appropriate cutting tool(s) to be used. When considering how to manage cut/puncture hazards associated with cutting tool use, a recommended best practice is to apply the following control measures listed in order of priority:

- Eliminate or avoid the hazard.
- Reduce the hazard by using safer cutting tool(s)/equipment or other engineering controls.
- Limit who is permitted to use cutting tools and/or locations they are used, and train those employees only.
- Train all employees on the proper use of cutting tools.
- Utilize personal protective equipment (PPE) such as cut-resistant gloves. This should be considered the last line of defense and used in conjunction with other control measures.

4.2 Cutting Tool Selection

- Use the cutting tools designed for the job.
- Do not use inadequate, inappropriate, or unsafe tools simply because they are available. Take the time to acquire the correct tool for the job.
- Use scissors/snips, safety cutters with guarded, concealed, or self-retracting blades; or other safety cutting devices without open or exposed blades whenever possible. Examples include the following:

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Safety cutter for opening packages



Snips



Guarded utility knife



Concealed blade cutters



Sheet cutter/letter opener



Core sleeve cutters




Tubing cutter



- Fixed open-bladed knives (FOBKs) are dangerous tools, but they are used so routinely that their hazards are often underestimated or ignored. Examples include pocket knives (including Leatherman and similar multi-tools), utility knives, box cutters (including cutters with spring loaded blades), and X-acto knives.



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The uncontrolled and unsafe use of FOBKs is a common factor in hand injuries (lacerations) reported within our industry. **For this reason, FOBKs are prohibited from being used unless they are determined to be the safest tool for the task.** This determination should be made in consultation with the PIC, Project Manager/Area Manager, and Business Unit Health and Safety Director. Note that some clients prohibit the use of FOBKs altogether; therefore, client expectations must be clearly known and understood.

- If FOBKs are to be used, their safe use must be documented in written job procedures (e.g. JHA), the blade must be locked when in use and protected when not in use, personnel must have received training on how to correctly and safely use the tool, and cut-resistant gloves must be worn during use. FOBKs that cannot be locked in the open position shall not be used.
- Kitchen knives used in designated kitchen areas for food preparation may be used without the requirement to document in a written job procedure or provide formal training; however their use should be consistent with other guidance outlined in Section 4.3.
- Paper shears pose a significant hazard and should only be used if no practicable alternative exists; a JHA has been prepared and reviewed by the H&S team; and only trained employees are permitted to use it. The procedure must include locking the shear in the closed position when not in active use, and preferably includes the use of cut-resistant gloves unless safety interlocks are incorporated into the design. Options to purchase shears with safety interlocks must be considered at the first available opportunity



4.3 Safe Cutting Tool Use

- Train personnel in the correct way to use cutting tools prior to use.
- Use the designated safest cutting tool for the task and ensure it is sharp.
- Inspect cutting tools prior to use to confirm they are in good condition and safe to use.
- **Always cut away from your hands and body,** keeping all body parts behind the blade and out of the "line of fire".
- Ensure you and other people in the area are out of the "line of fire" of the cutting tool's path/potential path (in event of tool slippage, etc.).
- Put the object to be cut in a vise or on a flat surface, or use another tool to hold the object instead of holding in your hand or against your body (e.g., do not hold the object to be cut against your thigh).

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- If the cutting tool is designed to be used with two hands, then it must be held with two hands. Saws-all and drills are designed to be held with two hands, but are commonly incorrectly held with one hand during use.
- Use the buddy system. Utilizing a co-worker to assist in cutting activities can often reduce hazards associated with cutting lumber, tubing, and piping.
- Always return cutting tools to an appropriate storage location. **Do not place cutting tools on the ground!**


4.4 Personal Protective Equipment

Gloves that are appropriate for specific task hazards and, in good condition, can prevent some injuries; however, gloves (and all PPE) are considered as a final barrier against potential injury. Gloves must be used in conjunction with other control mechanisms (see Section 4.1) as well as the appropriate cutting tool for the job.

Specific glove requirements for tasks to be performed on site must be stated in the JHA or equivalent written job procedure. Common glove types and levels of protection are as follows:

Glove Type	Protects From	Common Uses
Cotton, canvas cloth	Minor abrasions, chafing	Light duty (e.g., sweeping)
Leather, Aramid fiber, HexArmor™	Abrasions, punctures, minor lacerations	Handling rough, rigid or abrasive materials; working with hand and power tools (unless they may get caught)
Leather reinforced with metal or metal stitching	Abrasions, lacerations	Handling sharp-edged tools/equipment
Metal mesh, Stainless Core (stainless steel woven into material), Kevlar, HexArmor™	Lacerations and abrasions associated with glancing/slicing cuts	Using cutting tools; handling sharp/jagged tools and materials.
Nitrile-coated knit gloves	Chemicals, punctures	Clearing demolition and other uncontrolled debris

More information may be obtained from our internal PPE provider Northern Safety and Industrial (www.northernsafety.com). Cut-resistant gloves must be worn when using FOBKs, at a minimum.


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When several hazards are encountered that one glove will not provide adequate protection against, gloves should be layered accordingly. For example, when handling contaminated materials with sharp edges, inner nitrile gloves may be worn to protect against chemical hazards with outer cut-resistant gloves to protect against cuts and abrasions.

Protective gloves must be inspected before each use to ensure that they are not torn, punctured, or made ineffective in any way (e.g., wet/water soaked or dirty gloves can become slippery).

5. References

- ERM Form [ERM-1115-FM1](#) (*Job Hazard Analysis*)

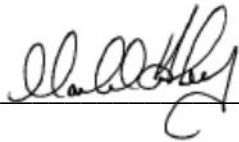
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Approval Signature: _____



Revision History

Section	Reason for Revision	Date
All	New document	10/23/13
All	Reformatted document; minor edits for clarity	6/1/15
4.4	Updated section to refer to Northern Safety	9/1/16
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/11/17

	Applicability:	Procedure	Document Number:	Version:
	North America		NAM-1325-PR1	3
	Title:	Bloodborne Pathogens	Last Revision Date:	1/19/18

1. Purpose and Scope

This document establishes procedures to identify jobs and tasks where occupational exposure to bloodborne pathogens (i.e., human immunodeficiency virus (HIV), hepatitis B and C viruses, and others) may occur and to implement controls which will eliminate or significantly reduce the risk of infectious bloodborne diseases. This procedure will also discuss provisions for employees to receive personal protective equipment (PPE), Hepatitis B vaccinations, training, and confidential medical evaluations and follow-up (if needed). This document applies to all ERM field and office locations.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensuring this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correcting any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director.

Project Manager (PM)/Area Manager: Responsible for the following elements:

- Performing observations of ERM work processes to assess whether or not this procedure is applicable and if those employees impacted by this procedure are operating in accordance with noted requirements;
- Stopping work where deviations from this procedure are observed; and
- Correcting, in conjunction with the PIC, Business Unit Health and Safety Director, and the Program Administrators, any observed deficiencies in the implementation of this procedure.


Business Unit Health and Safety Director: Responsible for the following elements:

- Evaluating implementation of this procedure during health and safety plan reviews and project audits; and
- Communicating identified deficiencies to the PIC.

Regional Health and Safety Director: Responsible for the following elements:

- Implementing this procedure throughout the Region; and
- Evaluating, in conjunction with the Global Occupational Health Manager, the Exposure Control Plan ([NAM-1325-WII](#)) on an annual basis.

Global Occupational Health Manager: Responsible for assisting the Regional Health and Safety Director in the annual Exposure Control plan review.

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3. Definitions

Bloodborne Pathogens: Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B and C virus and HIV.

Field Safety Officers (FSO): Employees who are responsible for the day-to-day implementation of ERM's health and safety processes on project sites.

Floor Wardens: Employees responsible for monitoring the presence of co-workers and visitors within the immediate seating area or zone of their office, and assisting in the orderly and safe evacuation of those personnel during a building evacuation or emergency.

4. Procedure

4.1 Exposure Determination


On ERM project sites, the PIC and PM, with assistance from the Business Unit Health and Safety Director, will perform an exposure determination concerning which employees may or may not have exposure to bloodborne pathogens. This exposure determination will be conducted as part of the initial project risk assessment and will be included in health and safety planning documents. Employees will be classified into two categories:

- Employees formally designated as part of their job to perform tasks that may involve direct contact with blood or potentially infectious body fluids. Typically ERM FSOs will be included in this category. These employees will require initial and annual training, will be offered the Hepatitis B vaccination series, and will be required to follow those procedures outlined in [NAM-1325-WI1](#) (*Exposure Control Plan*).
- Employees not assigned to jobs or tasks that involve exposure to blood or potentially infectious body fluids, but who could, in extraordinary situations, voluntarily assist injured or ill individuals and, therefore, could have exposure to bloodborne pathogens. These employees will follow post-exposure procedures as outlined in [NAM-1325-WI1](#) in an exposure occurs.

In ERM offices, the Area Manager, with assistance from the Business Unit Health and Safety Director, will perform similar exposure determination concerning employee exposure to bloodborne pathogens as indicated above. Typically exposed individuals will likely be limited to designated Floor Wardens.

4.2 Engineering Controls

Since ERM is a consulting firm, there are no typical operations applicable to bloodborne pathogens requiring engineering controls. However, if conditions warrant the use of engineering

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controls with regard to bloodborne pathogens (e.g., significant and continued exposure to sharps, site cleanups involving medical or infectious wastes), appropriate controls will be developed, examined, and maintained or replaced on an annual basis to ensure their effectiveness.

4.3 Exposure Control Methods

All employees will utilize universal precautions – an approach to infection control where all human blood and body fluids are treated as potentially infectious. Appropriate engineering and work practice controls (e.g., sharps disposal containers, performing procedures to prevent splashing) will be used to eliminate or minimize exposure to employees. Personal protective equipment (e.g., disposable gloves, face masks with eye protection) will be provided and used in order to place a barrier between the employee and the blood or body fluids.

Hands are to be washed immediately with soap and water after removing gloves or performing any work with blood or body fluids. Housekeeping and decontamination of work surfaces with EPA-registered germicides or a bleach solution diluted 1:10 with water, will be performed as needed to maintain a safe working environment.

In the event that an employee is exposed to blood or body fluids, they should immediately flush and clean the affected area with copious amounts of soap and water. WorkCare, ERM's Medical Services provider, will arrange a confidential medical evaluation and follow-up with an occupational physician for the employee as soon as possible following the report of an exposure incident.


Regulated biohazardous waste (contaminated sharps or items that are capable of releasing blood or body fluids through employee handling) will be disposed of in special waste receptacles lined with red bags and incinerated per federal and state regulations. This does not include small amounts of waste from a minor wound which can be sealed in a plastic bag and disposed of in regular trash

4.4 Hepatitis B Vaccination

The Hepatitis B vaccination series will be made available at no cost to all employees who have been designated to perform tasks that may involve direct exposure to bloodborne pathogens. Further, this vaccination series will be made immediately available to employees that have had an occupational bloodborne exposure incident, whether as a result of their assigned tasks or occurring as a result of incidental contact.

Employees may choose to decline the Hepatitis B vaccination upon offer by completing [NAM-1325-FM1](#) (*Hepatitis B Vaccination Declination Form*). If in the future the employee desires to complete the vaccination series due to continued occupational exposure, it will be provided at no cost.

Medical records will be maintained for the employee's duration of employment plus 30 years.

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4.5 Training

Initial and annual training classes for bloodborne pathogens are available through both external training providers and through ERM's Academy Learning Management System (LMS). Training will be conducted for all employees assigned to tasks where occupational exposure may occur. Records will be maintained for a minimum of three years.


4.6 Access and Review of Written Procedures

All employees or their representatives and governmental officials may request a copy of any written program by contacting their Business Unit Health and Safety Director.

This procedure will be reviewed and updated at least annually and whenever necessary to include new or modified tasks or procedures.

5. References

- ERM Procedure [NAM-1811-PR1](#) (*Access to Medical and Exposure Records*)
- ERM Form [NAM-1325-FM1](#) (*Hepatitis B Vaccination Declination Form*)
- ERM Work Instruction [NAM-1325-WI1](#) (*Exposure Control Plan*)
- Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.151 (*Medical Services and First Aid*)
- OSHA 29 CFR 1910.1030 (*Bloodborne Pathogens*)

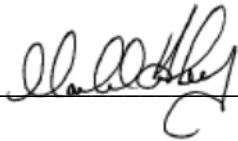
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Revision History

Section	Reason for Revision	Date
All	New document.	2/22/16
4	Added information on record retention	1/19/18

	Applicability:	Work Instruction	Document Number:	Version:
	North America		NAM-1325-WI1	2
	Title:	Exposure Control Plan	Last Revision Date:	1/10/17

1. Purpose and Scope

Employees are at risk for exposure to and possible transmission of infectious diseases each time they are in contact with blood or body fluids. Bloodborne pathogens are microorganisms present in human blood and other body fluids that can cause serious disease in humans and include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). This exposure control plan (ECP) has been established to ensure that employees are effectively informed concerning potential workplace health hazards and protective measures necessary to eliminate or minimize bloodborne exposure incidents are utilized whenever possible.

2. Exposure Determination

Project-specific risk assessments will be used to evaluate which employees may incur occupational exposure to blood or other potentially infectious materials when performing routine tasks and procedures. These exposure determinations will be made without regard to the use of personal protective equipment and regardless of exposure frequency.

The employees in the following job classifications may have occupational exposure to bloodborne pathogens and are covered by this program:

- Field Safety Officers
- Lead Floor Wardens


Tasks and procedures which may expose employees to bloodborne pathogens include, but are not limited to:

- Treating cuts, abrasions, and burns;
- Cleaning contaminated environmental surfaces;
- Administering cardiopulmonary resuscitation (CPR);
- Collecting samples at municipal waste sites or sewage lagoons; and
- Environmental sewer samplers.

3. Exposure Control

3.1 Universal Precautions

Universal precautions are a required method of control to prevent exposure to blood and body fluids. This term refers to the concept that all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, HCV, and other bloodborne pathogens, regardless of the perceived risk status of another individual. Universal precautions apply to blood

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and other body fluids containing visible blood, semen, and vaginal fluids. Universal precautions do not apply to feces, nasal secretions, saliva, sweat, tears, sputum, urine, and vomitus unless they contain visible blood. Although these fluids have an extremely low or nonexistent risk for bloodborne pathogens, they are a potential source for other infectious diseases and precautions should also be followed when these body fluids are present.


3.2 Engineering and Work Practices

The following engineering controls shall be in place in all areas of occupational exposure:

- Accessible handwashing facilities. If soap and running water are not available, an antiseptic hand cleaner in conjunction with clean paper towels or antiseptic towelettes is an acceptable temporary alternative to running water. When this alternative method is used, employees must wash their hands with soap and running water as soon as feasible.
- Containers for disposable contaminated sharps will be puncture resistance, labeled a biohazard, leak-proof, and have a closable top.
- Containers for storage, transport, or shipment of blood or other potentially infectious materials, regulated waste, and contaminated laundry will be labeled with the biohazard symbol, site address, and have a securely closing lid.

The following work practice controls must be strictly followed to minimize exposure and isolate or remove bloodborne pathogens from the workplace.

- Personal protective equipment (PPE) will be provided at no cost to the employee and will be chosen based on the anticipated exposure to blood. PPE is considered appropriate if it does not permit blood or other potentially infectious materials to reach or pass through clothes, skin, or mucous membranes of the eyes or mouth under normal conditions of use and for the duration of time the equipment will be used. PPE must be readily accessible and will be removed prior to leaving the work area.
- Disposable, single use gloves shall be used as a protective barrier in all situations in which contact with body fluids is anticipated. Gloves of the correct size will be provided. Disposable gloves will not be washed or disinfected for reuse and will be replaced if they become torn or punctured. Gloves are especially important if the employee has cuts, abraded skin, chapped hands, or dermatitis.
- Liquid impermeable gowns, boots, and masks, in combination with eye protective devices such as goggles and shatterproof glasses with solid-side shields or chin-length face shields, shall be worn whenever splashing, spraying, or spattering of blood droplets or body fluids can be reasonably anticipated.
- Eating, drinking, smoking, applying cosmetics, and handling of contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure. Food and

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drink will not be kept in refrigerators, freezers, shelves, cabinets, or on counter tops where blood or body fluids are present.

- Contaminated needles and other sharps will not be bent or recapped unless a one-handed technique is used. They will be disposed of in an appropriate sharps container.
- All regulated, biohazardous waste will be placed in a waste receptacle that has designated red biohazard bags and a closable top controlled by a foot peddle. When full, the bags shall be removed with gloved hands, tied off, and placed in a biohazard shipping carton, to be held for pick-up. If any biohazard bag appears to be leaking, it must be double-bagged. The waste will be incinerated per federal and state regulations


3.3 Housekeeping

- Universal precautions will be used when cleaning or decontaminating any surface or equipment that may be contaminated. Appropriate PPE will be used for protection during decontamination.
- All contaminated environmental work surfaces such as countertops or floors will be cleaned with a household bleach solution diluted 1:10 with water directly following contamination with blood or body fluids.
- Instruments such as tweezers, bandage scissors, and thermometers will be disposable rather than reusable equipment and will be disposed of in an appropriate manner.
- Broken, contaminated glassware will not be picked up directly with the hands. It will be cleaned up using a mechanical means such as a brush and dustpan or tongs.

4. Hepatitis B Vaccination

Within 10 working days of placement, all employees assigned to tasks with potential occupational exposure to bloodborne pathogens will be offered the Hepatitis B vaccination at no cost to the employee, unless the employee has had a previous Hepatitis B vaccination series, antibody testing reveals the employee is immune or the vaccine is contraindicated for medical reasons. Further, this vaccination series will be made immediately available to employees who have an occupational exposure whether as a result of their assigned tasks or occurring from an incidental contact. ERM will work with our Medical Services Provider WorkCare to identify local occupational medical facilities to administer the vaccinations.

Employees who decline the Hepatitis B vaccine will sign a copy of the waiver form located in [NAM-1325-FM1](#) (*Hepatitis B Vaccination Declination Form*). The signed waiver will be stored in the employee's personal medical record. Employees may initially decline the vaccination, but at a later date, while still covered under this plan, may then decide to take them. The vaccinations will be made available to the employee at that time.

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Employees choosing to take the vaccination series will sign a consent form at the occupational clinic prior to receiving the injections and are advised to read the package insert regarding the efficacy, safety, method of administration, and benefits of the vaccine. Employees may also ask questions directly of ERM's Medical Service Provider WorkCare or the local occupational physician. Employees are not required to participate in a prescreening program (to determine immunity) before receiving the vaccinations. If a routine booster of Hepatitis B vaccine is recommended by WorkCare at a future date, such booster doses will be made available to affected employees.

5. Post Exposure Incident Evaluation and Follow-Up


All occupational bloodborne pathogen exposures are to be reported to Business Unit Health and Safety Director immediately after initial decontamination and first aid is accomplished. Following the report of an exposure incident, a confidential medical evaluation with an occupational physician will be arranged as soon as possible, ideally no later than 1 to 2 hours after the incident has occurred. In some areas, regulatory statutes allow the employee to choose treatment from their personal physician. A copy of [NAM-1325-PR1](#) (*Bloodborne Pathogens*) and all attachments will be provided. An incident report will be filed as soon as possible using ERM's Event Communication System (ECS).

5.1 First Aid Protocol for Exposure Incident

- Lacerations, punctures, and abrasions should be washed under cool running water for at least five minutes allowing free bleeding. Cleanse area well with soap or iodine solution. Apply sterile dressing as needed. Give tetanus booster if indicated (7 to 10 years since last booster).
- Ocular exposure requires irrigation of the eye with water or sterile normal saline solution for 15 minutes.
- Mucous membrane exposure requires rinsing mouth with ½ strength 3% hydrogen peroxide for 30 seconds for four separate and consecutive times.

5.2 Confidential Medical Evaluation

The treating occupational physician will receive documentation of the routes of exposure, the circumstances surrounding the incident, and identification of the source individual (the individual the employee was exposed to). The blood of the source individual will be tested if possible and after consent is obtained. When legally permissible, results of testing of the source individual will be made available to the exposed employee with the exposed employee informed about the applicable laws and regulations concerning the disclosure of the identity and infectivity of the source individual.

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Testing of the exposed employee's blood, if consented to (the employee may consent to baseline blood collection, but may request that the sample not be tested for HIV for up to 90 days, if at all), is recommended. Post-exposure medical treatment will be offered in accordance with the current recommendations of the U.S. Public Health Services. This may include, but is not limited to:

- A series of HIV post-exposure blood tests;
- Hepatitis B vaccination and/or hepatitis B immunoglobulin;
- HIV post-exposure prophylactic medications;
- Evaluation of acute febrile illnesses following exposure; and
- Employee counseling concerning precautions to take during the period after the exposure incident and information on signs and symptoms of potential illnesses.

5.3 Healthcare Professional's Written Opinion


The Business Unit Health and Safety Director will obtain and provide the employee with a copy of the evaluating physician's written opinion within 15 days of the completion of the medical evaluation. A copy will be maintained in the employee's confidential medical record. The written opinion will be in accordance with the requirements of [NAM-1325-PR1](#) indicating that the employee has been informed of any medical conditions resulting from exposure that require further evaluation or treatment. All other findings or diagnoses will remain confidential and will not be included in the report.

6. Hazard Communication

Fluorescent red or orange-red warning labels bearing the universal biohazard symbol and the legend "BIOHAZARD" must be firmly affixed to all containers (e.g., waste cans, sharps containers, and refrigerators) used for the storage or shipment of blood or other potentially infectious materials.

All employees designated to perform tasks involving occupational exposure shall receive bloodborne pathogens training at the time of or before initial assignment to the job. This training will be given during working hours and at no cost to employees. Refresher courses will be provided annually and if new tasks or procedures are implemented. Material appropriate in content and vocabulary to education level, literacy, and language of the employees shall be used for all required training.

Training will include general discussion on bloodborne diseases and their transmission, exposure control plans, engineering and work practice controls, personal protective equipment, hepatitis B vaccine, response to emergencies involving blood, how to handle exposure incidents, the post-exposure evaluation and follow-up program, and signs/labels/color-coding.

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7. Exposure Incident Investigation


The Business Unit Health and Safety Director will review the circumstances of any exposure incident to determine corrective actions. The incident report will be completed in accordance with ERM Procedure [ERM-1201-PR1](#) (*Injury or Illness Reporting and Recording*).

The ECS report will be reviewed by the Regional Health and Safety Director as well as the Global Manager of Occupational Health, who will evaluate what follow-up actions, should be addressed, including if revisions need to be made to the Exposure Control Plan.

8. Recordkeeping

ERM will be responsible for establishing and maintaining accurate, confidential workers' compensation medical records for each employee with occupational exposure for the duration of employment plus 30 years. Training records for employees maintaining bloodborne pathogens training requirements will be stored in ERM's Academy Learning Management System for at least 3 years from the date of training. The records will include the date of the training class, a summary of the class contents, the names of the qualified instructors, and the names and job titles of person attending the training.

Employee medical records will be made available to employees (or their designated representative) with written consent by the employee within 15 working days of request.

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	North America		NAM-1329-PR1	2
	Title:	Hand Tools and Portable Power Equipment	Last Revision Date:	1/10/17

1. Purpose and Scope

This procedure establishes minimum requirements for work with hand tools and portable powered equipment. The purpose of this procedure is to ensure that hand tools and portable power equipment meet minimum safety requirements, are used in a the manner for which they are intended, and are maintained in a safe condition. This procedure is applicable to all North American operations.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director or other staff member.

Project Manager: Responsible for the following elements:

- Perform observations of ERM work processes to assess employee compliance with this
- procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Business Unit Health and Safety Director: Responsible for the following elements:


- Evaluate implementation of this procedure during project audits; and
- Communicate identified deficiencies to the PIC.

3. Definitions

Portable Power Equipment: Electric, pneumatic, gasoline or explosive-actuated hand tools.

Ground Fault Circuit interrupters (GFCI): A device that shuts off an electric power circuit when it detects that current is flowing along an unintended path, such as through water or a person.

Underwriters Laboratories (UL): A global product safety testing and certification organization.

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4. Procedure

4.1 General Equipment Requirements


- All hand and portable power tools shall be maintained in safe working order and used only for the task for which they were designed.
- Hand and portable power tools, power supplies, and flexible cord sets (extension cords) shall be inspected prior to each use to identify any defects. Damaged or defective tools shall be immediately removed from service and identified through tagging or lockout of controls.
- Tool surfaces and handles shall be kept clean and free of dirt, grime, and excess oil to prevent slipping.
- Tools shall be cleaned and properly stored when not in use to prevent possible injuries and tool damage.
- Non-sparking tools shall be used in atmospheres with fire or explosive characteristics.
- Eye protection shall be used at all times during tool operation. Additional personal protective equipment (PPE) appropriate to the tool operation or work task shall be required and used, including face shields, hearing protection, respiratory protection and protective gloves.

4.2 Hand Tool Use

- Do not force tools beyond their capacity or use cheater bars or other instruments to increase their capacity.
- Do not use hand tools as pry bars.
- Do not throw tools from place to place or person to person.
- Do not drop tools from heights.
- Ensure that hands, fingers, and other body parts are out of the line of fire during tool usage.
- Brace yourself when using the tool in case the tool slips.

4.3 Portable Power Tool Use


- Loose clothing, long hair, loose jewelry, rings and chains are not allowed while working with power tools.
- Hands shall be kept clear of all cutting, rotating, or moving parts of powered tools.
- Portable power tools shall be safety tested and certified by Underwriters Laboratories (UL) or an equivalent authority.

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- Electric power tools must be either double-insulated or equipped with a 3-wire grounded wiring and plug.
- Adapters which interrupt the continuity of the equipment grounding connection shall not be used.
- Tools shall only be used with a GFCI or a GFCI adapter. Do not handle wet cords and power tools unless they have been deenergized.
- Guards and safety devices provided by tool manufacturers shall not be removed or modified in any way which may interfere with their intended function.
- Portable equipment shall be handled in a manner which will not cause damage. Flexible electric cords shall not be used for raising or lowering the equipment and cords should not be fastened in any way that potentially damages the outer jacket or insulation.

5. References

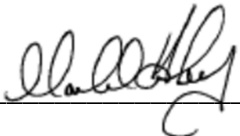
- Occupational Health and Safety Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910 Subpart P (*Hand and Portable Powered Tools and Other Hand-Held Equipment*)
- OSHA Regulation 29 CFR 1926 Subpart I (*Tools – Hand and Power*)

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Document Control Information


Original Effective Date: 6/29/15

Policy Approval by: Mark Hickey

Approval Signature:  _____

Revision History

Section	Reason for Revision	Date
All	New document	6/29/15
All	Updated Document Number; updated titles (Section 2); updated paragraph alignment throughout; updated referenced document numbers (Section 4); updated References (Section 5)	1/10/17

	Applicability:	Standard	Document Number:	Version:
	North America		NAM-1361-ST1	2
	Title:	Insect Bite Prevention	Last Revision Date:	1/10/17

1. Purpose and Scope

This document establishes procedures for the protection of personnel working on field projects with the potential for exposure to insect and arachnid bites, including mosquitoes and ticks. The standard applies to all North America operations where these hazards have been identified.

2. Roles and Responsibilities

Partner in Charge (PIC): Responsible for the following elements:

- Ensuring this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correcting any deficiencies in the implementation of this procedure as identified by the Business Unit Health and Safety Director.

Project Manager (PM)/Supervisor: Responsible for the following elements:

- Performing observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure;
- Pausing or stopping work where deviations from this procedure are observed; and
- Correcting, in conjunction with the PIC and the Business Unit Health and Safety Director, any observed deficiencies in the implementation of this procedure.

Business Unit Health and Safety Director: Responsible for the following elements:


- Evaluating implementation of this procedure during health and safety plan reviews and project audits; and
- Communicating identified deficiencies to the PIC.

3. Definitions

Babesiosis: A rare, severe and sometimes fatal tick-borne disease caused by various types of *Babesia*, a microscopic parasite that infects red blood cells. It is transmitted by the bite of an infected *Ixodes* tick (e.g., deer ticks).

DEET: A synonym of N,N-dimethyl-meta-toluamide. It is the most common active ingredient in insect repellents, providing protection against mosquitoes, ticks, fleas, chiggers, and many other biting insects.

Lyme disease: An infectious disease caused by the *Borrelia* bacteria, it is transmitted to humans by the bite of infected *Ixodes* ticks (e.g., deer ticks). Signs of infection may include a red rash (sometimes seen as a bulls-eye), fever, headache, weariness, joint pains, heart palpitations, and memory loss.

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Permethrin: A chemical belonging to the pyrethroid family which is widely used as an insecticide and insect repellent.

Picardin: A synthetic compound resembling the natural compound piperine, found in the plants which are used to produce black pepper. It is used as an insect repellent for insects, ticks, and chiggers.

Rocky Mountain spotted fever: An infectious disease caused by the *Rickettsia* bacteria; it is transmitted to humans by the bite of infected *Dermacentor* ticks, a type of hard shelled tick (e.g., dog ticks). Initial signs and symptoms include sudden onset of fever, headache, and muscle pain, followed by development of a substantial rash. The disease is fatal in 3 to 5% of those who contract it.

West Nile virus: A member of the virus family *Flaviviridae* spread by various species of mosquitoes. Most infections (~80%) cause no symptoms. In less than 1% of cases, severe infection occurs which may result in neurological disease affecting the central nervous system, including encephalitis (inflammation of the brain) and meningitis (inflammation of the membranes covering the brain and spinal cord).

Zika virus: A member of the virus family *Flaviviridae* spread by the daytime-active *Aedes* mosquitoes. Zika virus is related to dengue, yellow fever, Japanese encephalitis, and West Nile viruses. It typically causes no or only mild symptoms, although it may spread from a pregnant woman to the baby, potentially resulting in microcephaly and other severe brain problems. Zika infections in adults can result in Guillain-Barre syndrome.

4. Standard


4.1 Hazard Assessment and Project Planning

Prior to the initiation of field work, the project team is required to perform a hazard assessment of the planned scope of work. This is done to identify any hazards that may impact project operations and the safety of ERM staff, as well as to identify the appropriate methods for mitigation. Mosquitos have the potential to transmit the West Nile or Zika Virus and ticks can transmit various tick-borne diseases such as Lyme disease, Rocky Mountain spotted fever, and *Babesiosis*. Therefore, if it is determined that any member of the project field team is likely to be exposed to mosquito or tick prone environments, the following measures must be incorporated in the development of the project health and safety plan (HASP).

4.2 Mitigation Measures

4.2.1 Avoidance Measures

Avoidance of the exposure must be considered as first priority before entering the field. An effort should be made to schedule work to avoid hours of peak mosquito activity, which are

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during the early morning and evening hours. Additionally, the identification of biting insect habitats such as grasslands, prairies, woodlands, and wetlands should also be identified, communicated to the field staff, and avoided to the extent practical.

The following measures must be implemented while out in the field:

- Avoid sitting on the ground.
- Wear long-sleeved, light colored garments.
- Tuck in shirts and tuck pants into socks or boots.
- Scan clothes, exposed skin, and equipment for ticks frequently. Ticks will climb upward in search of exposed skin, so check frequently.
- Shake off clothing and examine equipment before entering vehicles.
- Check vehicle for ticks. Placing a white or light colored cover over vehicle seats will aid with visual identification of ticks on the seats after the completion of field work.
- Conduct tick checks frequently, on self and on each other. At a minimum this should be done during breaks and before entering vehicles.

The following measures must be implemented when returning home or to the hotel at the end of the day:


- Shower as soon as you return to your room from the field. Showering should take place before doing any other activity.
- Wash and dry clothes in dryer for 20 minutes if possible; and
- Conduct a full body tick check using a mirror. Attached ticks generally climb upward until they reach a protected or creased area, often the back of the knee, groin, navel, armpit, ears, or nape of the neck.

4.2.2 Application of Topical Insect Repellent

While in the field, project team members are required to carry and periodically apply repellent containing DEET or an effective DEET alternative (e.g., Picaridin). Follow the product label application instructions printed on the bottle by the manufacturer.

Application tips and suggestions:

- Apply repellents only to exposed skin or clothing, as directed on the product label. Do not apply repellents under clothing.
- Repellents should be applied to field gear (e.g., backpacks) for additional protection.
- If wearing flame resistant clothing (FRC), make sure the repellent is safe to use with FRC. Some repellents can damage FRC.

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- Never use repellents over cuts, wounds, or irritated skin.
- When using sprays, do not spray directly on face—spray on hands first and then apply to face. Do not apply repellents directly to eyes or mouth, and apply sparingly around ears.
- Wash hands after application to avoid accidental exposure to eyes or ingestion.
- Use enough repellent to cover exposed skin and clothing. If biting insects do not respond to applied repellents, apply a second application.
- After returning indoors, wash repellent-treated skin.

Repellant product specific Safety Data Sheets (SDS) should be obtained and kept with the project HASP.

4.2.3 Field Clothing and Pretreatment


In addition to the application of topical repellent, team members working in project environments that present a high risk of staff exposure to biting insects (as determined by the project team) are required to use treated clothing.

The cost of clothing treatment is considered a personal protective equipment expense and should be budgeted by the project team. There are two options for clothing treatment:

- **Factory-Applied Clothing Treatment:** Factory applied insect repellent to apparel has been proven to be the most effective option available to prevent exposure to mosquitos and ticks. There are several clothing brands (including, but not limited to, InsectShield[®], ExOfficio[®], and Columbia[®]) that sell garments treated with permethrin that can minimize exposure to biting insects. Costs of these garments vary and can range from \$50 to \$100 USD for a shirt or pants.

For untreated garments owned by staff that are more adapted to heavy field use (i.e., jeans, high-vis shirts, or Carhartts[®]), [Insect Shield[®]](http://www.insectshield.com) offers a service to treat garments with a formulation of permethrin. The garments to be treated are mailed to InsectShield[®] and returned within a week. The product is United States Environmental Protection Agency (USEPA) registered, which is designed to evaluate a proposed product to ensure it will not have adverse effects on people or the environment. InsectShield[®] states that the treatment can last up to 70 washes. A “how-to” video, shipping details, and pricing guide can be found on their website (www.insectshield.com). The standard cost to treat clothing is \$10 USD per garment. Cost options should be factored into project budgets.

- **Self-Applied Clothing Treatment:** Insect repellent that is applied to field clothing by the employee is also an effective method of bite prevention. Several types of repellents are available on the market that can be applied to clothing in either a spray or a liquid soak method. These products are available from retailers, including but not limited to, Walmart, Bass Pro Shop, and Cabelas.

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- [Permethrin Spray](#) – Non-aerosol and aerosol spray treatments can be effective against ticks, chiggers, and mosquitoes. Typically, one bottle contains enough spray to treat up to two outfits. One treatment will last up to six washings or six weeks. Permethrin should never be applied to skin but only to clothing, gear, or other fabrics as directed on the product label.
- [Sawyer Permethrin Soak Treatment](#) - This kit provides the same protection for clothing as the Permethrin spray, but in a soak treatment that is effective for six washings or six weeks. Soak your items in the solution for two hours and hang to dry.

It is important to note that due to the shorter effective duration for self-applied clothing treatments, an employee-maintained schedule for reapplication of the product should be implemented through the duration of the field season

4.2.4 Employee Reaction to Repellents/Treatments

ERM recommends that the employee “test” repellents and treated clothing prior to field use. If an employee experiences a rash or other reaction, such as itching or swelling, from an insect repellent, the repellent should be washed off with mild soap and water and its use discontinued. If a severe reaction has occurred, WorkCare should be called for further guidance.


4.2.5 Staff Substitutions

ERM will not require staff to use chemically treated clothing or repellents if they have health concerns. However, when the project HASP identifies a reasonable potential for ERM staff to be exposed to biting insects, the PM and PIC are responsible to ensure that field staff are properly equipped, educated, and willing to apply topical insect repellent and utilize pretreated clothing. In the event that an employee is not willing to wear treated clothing, apply insect repellent, or identify an effective alternative to either, then their role in the field effort should be reconsidered by the project management.

For more information regarding bite prevention strategies and clothing treatment options, contact your Business Unit Health and Safety Director.

5. References

- ERM Procedure [NAM-1310-PR1](#) (*Personal Protective Equipment*)
- ERM Procedure [NAM-1110-PR1](#) (*Project Health and Safety*)

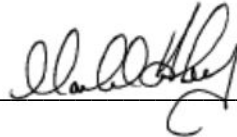
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Document Control Information

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Approval Signature: _____



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